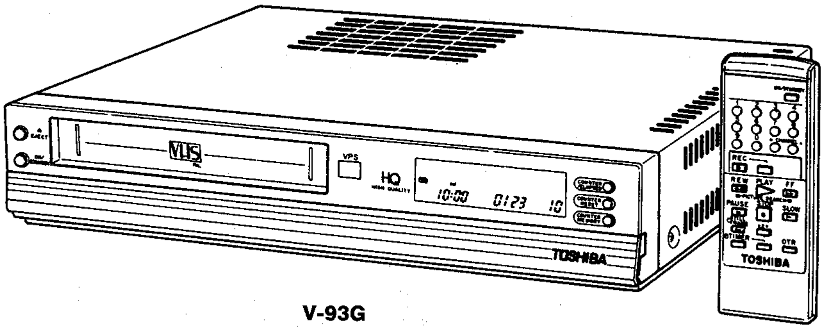
SERVICE DATA
FILE NO. 030 - 221

TOSHIBA
COLOR VIDEO CASSETTE RECORDER
V-93G/T/W



V-93G

SPECIFICATIONS

GENERAL

Video recording system:	Head configuration 2-head rotary
Video signal:	CCIR standard PAL color
Storage temperature:	−20° to +60°C (−4° to +140°F)
Operating temperature:	5° to 40°C (41° to 104°F)
Antenna:	75-ohms external aerial terminal for UHF
Channel coverage:	

	STD	CATV
VL	E2 — E4 (V-93G/W)	X, Y, Z
	A, B, C (V-93T)	
VH	E5 — E12 (V-93G/W)	S1 — S20
	D — H1, H2 (V-93T)	
UHF	21 — 69	—

a total of up to 32 preselected channels

AERIAL output signal:	UHF channel E31 to E39 (variable)
Power requirement:	AC 220V, 50 Hz
Power consumption:	27W
Weight:	7.2 kg
Dimensions:	430 x 85 x 348mm (W/H/D)

VIDEO

Input:	VIDEO LINE IN: 21 pin Euro-connector, 1.0V(p-p), 75-ohms unbalanced, sync negative
Output:	VIDEO LINE OUT: 21 pin Euro-connector, 1.0V(p-p), 75-ohms unbalanced, sync negative
Signal-to-noise ratio:	Better than 43 dB

AUDIO

Input:	AUDIO LINE IN: 21 pin Euro-connector, more than 10 k-ohms, −5 dBs
Output:	AUDIO LINE OUT: 21 pin Euro-connector, less than 1 k-ohm, −5 dBs
Frequency response:	80 to 10 kHz
Signal-to-noise ratio:	Better than 42 dB

TAPE TRANSPORT

Tape speed:	23.39 mm/sec.
Maximum recording-time:	4 hours (with E-240)
Fast forward time:	Within 6 min. (E-180)
Rewind time:	Within 6 min. (E-180)

TIMER

Fluorescent digital display
Count down from AC-line frequency

Caution: Copyright Act 1956 Users of video recording equipment should note that it may be unlawful to record television broadcasts, cinematograph films or video recording without the permission of the relevant copyright owner.

Design and specifications are subject to change without notice.

PRINTED IN JAPAN Sept., 1987 Ⓢ

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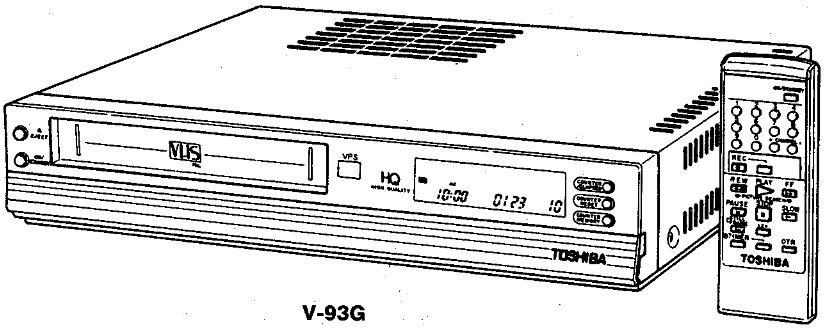

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Output: VIDEO LINE OUT: 21 pin Euro-connector, 1.0V(p-p), 75-ohms unbalanced, sync negative
Signal-to-noise ratio: Better than 43 dB

AUDIO

Input: AUDIO LINE IN: 21 pin Euro-connector, more than 10 k-ohms, −5 dBs
Output: AUDIO LINE OUT: 21 pin Euro-connector, less than 1 k-ohm, −5 dBs
Frequency response: 80 to 10 kHz
Signal-to-noise ratio: Better than 42 dB

TAPE TRANSPORT

Tape speed: 23.39 mm/sec.
Maximum recording-time: 4 hours (with E-240)
Fast forward time: Within 6 min. (E-180)
Rewind time: Within 6 min. (E-180)

TIMER

Fluorescent digital display
Count down from AC-line frequency

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CONTENTS

SECTION 1
GENERAL DESCRIPTION

OPERATION INSTRUCTIONS

FEATURES. 1-1
FRONT PANEL 1-2
REAR PANEL. 1-3
INDICATORS. 1-4
REMOTE CONTROL UNIT 1-5
CHANNEL SELECTION 1-6
SETTING THE VTR CLOCK 1-7
TAPE COUNTER. 1-8
SPECIALIZED PLAYBACK. 1-9
TIMER RECORDING 1-10
VPS RECORDING 1-12
ADDITIONAL INFORMATION FOR
TIMER RECORDING 1-13
ONE TOUCH TIMER RECORDING 1-14

CIRCUIT DESCRIPTIONS

1. RF and Receive Circuit. 1-15
2. Servo Circuit 1-19
3. Outline of VPS (V-93G). 1-26

SECTION 2
ADJUSTMENT PROCEDURES

1. **MECHANICAL ADJUSTMENT** 2-1
   1-1. Mechanical Parts Location. . . . 2-1
   1-2. Servicing Jig List 2-2
   1-3. Main Parts Replacement 2-3
   1-4. Check and Adjustment 2-14
2. **ELECTRICAL ADJUSTMENT** 2-20
   2-1. Power Supply Circuit 2-21
   2-2. PIF, Channel Selection Circuit .2-22
   2-3. Servo Circuit. 2-22
   2-4. Video, Video 2 2-23
   2-5. Audio Circuit. 2-27
   2-6. Wireless Remote Control Circuit.2-27

SECTION 3
SERVICING DIAGRAMS

1. **Inspection Procedure.** 3-1
2. **Removal of Cabinet.** 3-2
3. **Electrical Units Location Diagram** . . 3-2
4. **Standing PC Boards for Servicing.** . . 3-3
5. **Part Configuration and their Symbols.** 3-4
6. **Printed Wiring Board and Schematic Diagram** 3-7
7. **Power Supply**
   Block Diagram.3-9/PCB.3-33/Circuit.3-35
8. **PIF, Selector**
   (V-93G)
   Block Diagram.3-11/PCB.3-37/Circuit.3-39
   (V-93T)
   Block Diagram.3-11/PCB.3-41/Circuit.3-43
   (V-93W)
   Block Diagram.3-12/PCB.3-45/Circuit.3-47
   VPS Block Diagram. 3-18
9. **Timer**
   (V-93G)
   Block Diagram.3-14/PCB.3-49/Circuit.3-51
   (V-93T/W)
   Block Diagram.3-14/PCB.3-53/Circuit.3-55
10. **Logic**
    Block Diagram.3-20/PCB.3-57/Circuit.3-59
11. **Servo**
    Block Diagram.3-26/PCB.3-61/Circuit.3-63
12. **Video**
    Block Diagram.3-29/PCB.3-66/Circuit.3-71
13. **Audio**
    Block Diagram.3-32/PCB.3-74/Circuit.3-76
14. **Remote Control**
    Circuit.3-77

SECTION 4
PARTS LIST

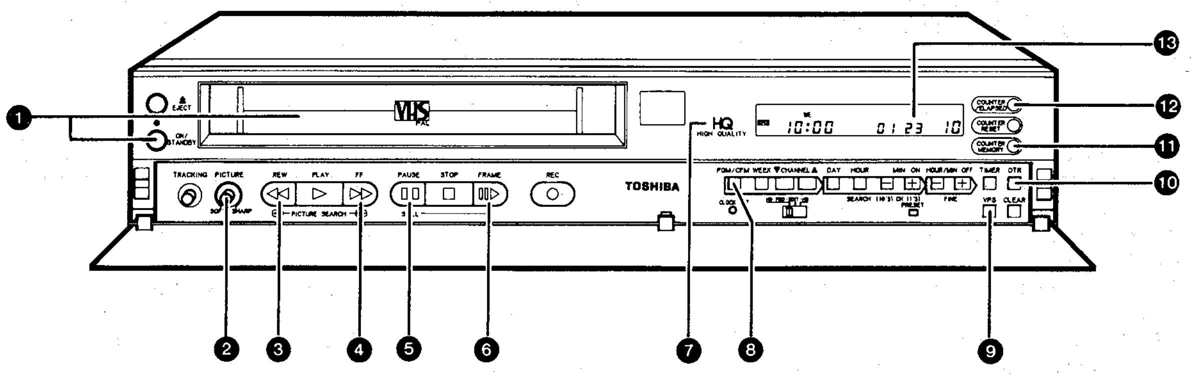
1. **Exploded View**
   (1) Packing Assembly. 4-2
   (2) Remote Control Unit 4-2
   (2) Cabinet Assembly. 4-3
   (3) Chassis Assembly. 4-3
   (4) Cassette Holder Assembly. 4-4
   (5) Mechanical Parts (1). 4-5
   (6) Mechanical Parts (2). 4-6
   (7) Mechanical Parts (3). 4-7
2. **Parts List.** 4-8

SECTION 1

GENERAL DESCRIPTION

OPERATING INSTRUCTIONS

FEATURES



① **Auto Power On and Fully-Automatic Play Function**
Even when the VTR unit is off, it will turn on automatically and then start playing when a video cassette without safety tab is inserted.

② **Picture Control**
This control allows you to select a softer or sharper picture.

③ **Reverse Picture Search**
Pressing the REW button in the playback mode allows you to play the tape quickly in the reverse direction about 7 times the normal speed and find the part you want to review.

④ **Forward Picture Search**
Pressing the FF button in the playback mode allows you to play the tape quickly in the forward direction about 7 times the normal speed and find the part you want.

⑤ **Still Picture**
The picture stops on the screen during playback.

⑥ **Frame Advance**
Pressing this button in the still mode allows you to advance the picture frame by frame.

⑦ **High Quality Picture**
The HQ (High Quality) feature reduces the noise of the brightness and colour signals. Image outline and detail are improved.

⑧ **Programme Check**
By pressing this button in the timer mode, the contents of the programme will be displayed consecutively on the fluorescent display. A great convenience for programming.

⑨ **VPS-System (V-93G)**
This function features the fully recording of the television programmes having VPS signals, from start to end, even if your desired television programme's start time is changed or rescheduled.

⑩ **One Touch Timer Recording**
This button can be pressed while in any mode to start immediate recording. The unit will record in periods of 30 minutes each time the button is pressed. The recording can be as long as 4 hours.

⑪ **Memory Function**
When the memory function is on, the tape stops at a counter reading of about "0000".

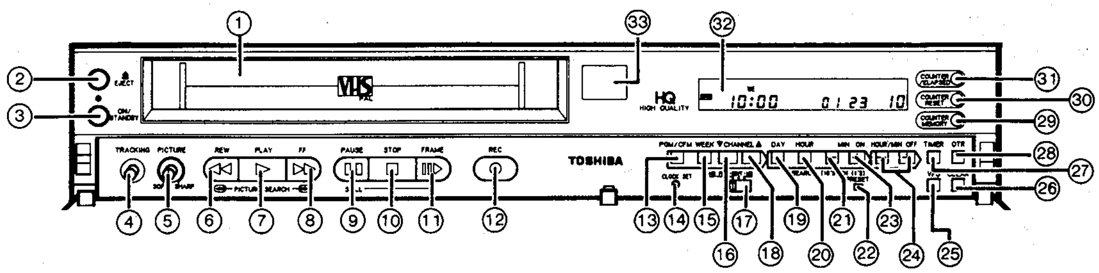
⑫ **Counter Memory and Elapsed Functions**
These buttons are used for two different operations. The one is the counter function, the other is the elapsed time function.
The elapsed time function tells you how long you have been recording a tape.

⑬ **Multifunctional Fluorescent Display**

Advanced Timer Function
The Upgraded timer function can be operated for 4 events. There is also a 21-day 4-programme setting.

FS (Frequency Synthesized) Tuner
This FS tuner automatically selects with the utmost accuracy, all receivable channels.

FRONT PANEL



FRONT PANEL

① **Cassette Compartment**
Slide the cassette into the unit until the mechanism draws it in automatically.

② **EJECT button**
Press this button to remove the cassette while the power is on.

③ **ON/STANDBY button**
This button is used to turn the VTR on and off.

④ **TRACKING control**
Use this control during playback to adjust the picture and eliminate or reduce noise.

⑤ **PICTURE control**
To make the picture sharper, turn the control clockwise; to make the picture softer, turn the control counterclockwise.

⑥ **Rewind button (REW)**
Press this button to rewind tapes. During the playback mode, pressing this button will allow you to play tapes in reverse rapidly.

⑦ **PLAY button**
Press this button to play back the pre-recorded cassettes.
The PLAY indicator comes on.

⑧ **Fast forward button (FF)**
Press this button to move tapes forward rapidly. During the playback mode, pressing this button will allow you to play tapes in the forward direction rapidly.

⑨ **PAUSE/STILL button**
Used to operate the VTR in two different ways:
A) To temporarily stop the tape in the recording mode.
B) To view a still picture in the playback mode.

⑩ **STOP button**
Press this button to stop the tape or interrupt the fully-automatic function.

⑪ **FRAME button**
Use this button to advance a frame by pressing this button in the still mode.

⑫ **Record button (REC)**
Press to start recording. The REC indicator comes on.

⑬ **PGM/CFM button**
This button has two functions:
Programme number selection and programmed data check.
Used to start timer operation and specify programme numbers 1 through 4 where the programme data is placed.
Also used to check the previously inputted programme data. Once this button is pressed, the programme scanning starts to continuously show the contents of the programme data 1 through 4 (start time and end time) on the fluorescent display.

⑭ **CLOCK SET button**
Used to set or reset the VTR clock. When this button is pressed once, the unit enters the clock set mode. When the button is pressed again after adjusting the VTR clock, the VTR clock starts to work.

⑮ **WEEK button**
Used to select the timer programmes for one day of the next week, one day of the third week and one day of every week.

⑯ **Channel select button (down)**
Used to select the specific channel which you wish to view or record. When the button is pressed once, the channel digit decreases by one.

⑰ **HQ PRO/EDIT/HQ switch**

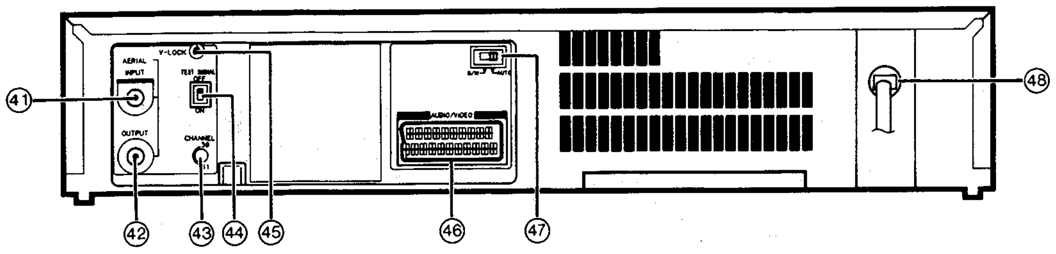
HQ PRO:	When recording in this position, enabling a distinct picture for recording and playback. We recommend this position for recording.
HQ:	For recording in an area where the broadcast is weak, this position may improve picture quality. Also, when snow occurs during playback, set to this position.
EDIT:	Set in this position when copying.

⑱ **Channel select button (up)**
Used to select the specific channel which you wish to view or record. When the button is pressed once, the channel digit increases by one.

⑲ **DAY button**
Used to specify the day. When the button is pressed once, the day of the week advances by one. When the button is kept pressed down, the days advance rapidly. Also used to select the programme for every day.

⑳ **HOUR button or SEARCH button**
Used to specify the hour digits. When the button is pressed once, the digit increases by one. When the button is kept pressed down, the hours change rapidly. Also used to search for the desired channel during channel presetting operation.

REAR PANEL



㉑ **MIN (−) button or channel 10's button**
Used to specify the minutes. When the button is pressed once, the digit decreases by one. When the button is kept pressed down, the minutes decrease rapidly. Also used to directly select the channel to be preset. When the button is pressed once, the channel changes by 10's digit.

㉒ **PRESET button**
Used to preset the channel.

㉓ **MIN (+) button or channel 1's button**
Used to specify the minutes. When the button is pressed once, the digit increases by one. When the button is kept pressed, the minutes increase rapidly. Also used to directly select the channel to be preset. When the button is pressed once, the channel changes by 1's digit.

㉔ **HOUR/MIN button or FINE (−)/(+) button**
Used to set the hour and minutes of your recording end time. When the button (+) is pressed once, the end time display increases by one minute. When the button (−) is pressed once, the end time display decreases by one minute. When the button is kept pressed down, the minutes increase or decrease rapidly according to the button actually pressed. Also used to make fine adjustment during channel operation.

㉕ **VPS button (V-93G)**
Used to switch the VPS recording on or off.

㉖ **CLEAR button**
Used to cancel the data that was preset to the programme numbers 1 through 4. Select the programme number where the preset data is to be cancelled with the PGM/CFM button, press the CLEAR button.

㉗ **TIMER button**
Used to enter the timer mode. To release the timer stand-by mode, press it again.

㉘ **OTR button**
Used to carry out recording in units of 30 minutes in normal mode. (Up to 4 hours)
Used to specify the timer-off time in units of 30 minutes in the timer mode.

㉙ **COUNTER MEMORY button**
When the button is pressed the indicator "M" is displayed and the tape stops at a counter reading ofabout 0000 during rewinding and fast forward modes.

㉚ **COUNTER RESET button**
By beginning the recording at "0000", subsequent playback will be more convenient.
Pressing this button in the counter mode will reset the tape counter to "0000".
Also used to reset the elapsed time display to "0:00".

㉛ **COUNTER/ELAPSED button**
Used to change the display from counter to elapsed time display or from elapsed time to counter display. The elapsed time function is available only in the recording mode.

㉜ **Fluorescent display**

㉝ **Infrared remote control receiver**
This sensor is used for receiving infrared signals from the Remote Control Unit.

REAR PANEL

㊶ **AERIAL INPUT socket**
Connect the aerial lead to this terminal.

㊷ **AERIAL OUT plug**
Connect this terminal to the socket on the TV.

㊸ **UHF CHANNEL control**
The output from the VTR to your television receiver can be adjusted to any channel from 31 to 39 by using a screwdriver.

㊹ **TEST SIGNAL switch**
Provides a test signal to assist you to tune your television receiver to the output of the VTR.

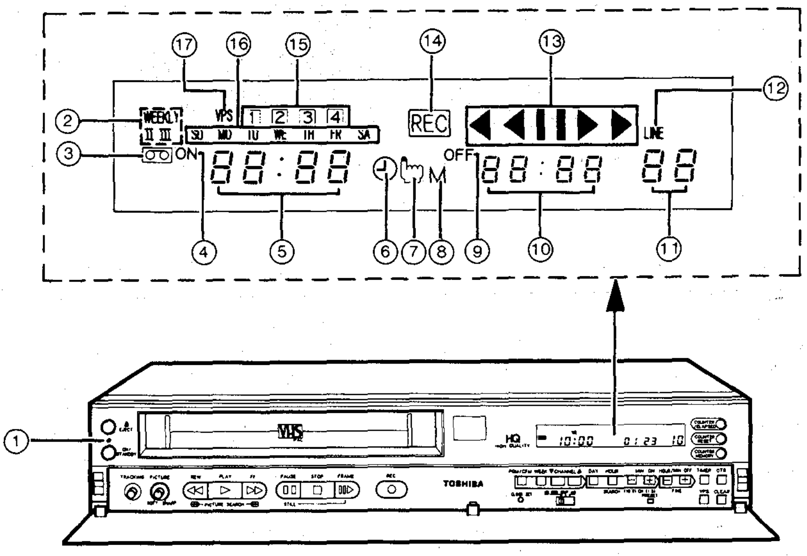
㊺ **V-LOCK control**
The playback picture may be distorted depending on the TV's used for two times playback. Adjust this control to minimum when the picture jitters vertically in the two times playback mode.

㊻ **AUDIO/VIDEO connector**
This 21 pin euro-connector is used to receive audio and video signals from the external source with the same type of socket.

㊼ **B/W-AUTO switch**
This switch should normally be set to the "AUTO" position. In a weak signal area, set this switch to the "B/W" position. In the playback mode, set this switch to the switch setting position used for recording.

㊽ **Power lead**
Connect to wall AC outlet (220V, 50Hz)

INDICATORS



INDICATORS

① **ON/STANDBY indicator (Green)**
Lit when the power is on.

② **WEEK indicator**
Lit when the WEEK button is pressed. (II → III → WEEKLY)

③ **Cassette indicator**
The lamp is lit when a cassette is loaded, even when the power is off. The lamp flashes when a tape is being inserted or ejected.

④ **Programme timer start time indicator (ON)**
Lit during timer programme setting.

⑤ **Clock indicator and timer start time indicator**
Shows the current time or timer start time during timer programme setting.

⑥ **Timer indicator**
Lit when the TIMER button is pressed.

⑦ **OTR indicator**
Lights during one touch recording.

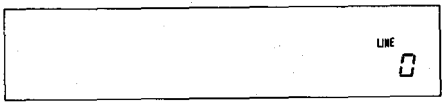
⑧ **Memory indicator**
Lit when the MEMORY button is pressed. Goes off when the MEMORY button is pressed again.

⑨ **Timer end time indicator**
Lit during timer end time setting operation.

⑩ **Shows the timer programme end time, counter display as well as elapsed time display (only in the recording mode).**

⑪ **Channel indicator**
Lights when a signal is being received from the VTR tuner. Indicates the channel currently watched or recorded.

⑫ **Lit when the channel position is set to 0 to receive the external signals.**



⑬ **Multifunctional indicators**

▶ PLAY	❚❚ STILL	REC ▶ REC
◀◀ REW/ Reverse Picture Search	▶▶ FF/ Forward Picture Search	❚▶ SLOW
❚❚▶ FRAME	REC ❚❚ PAUSE	

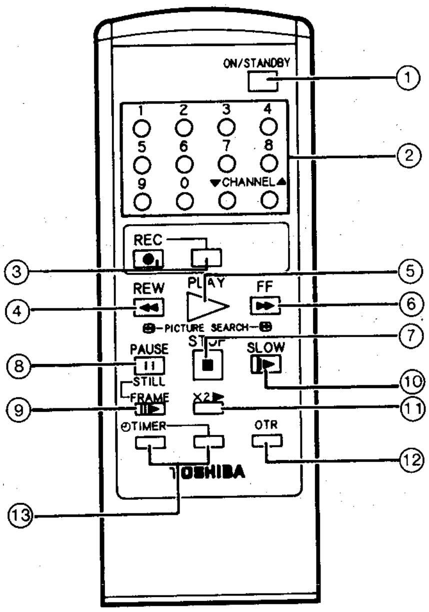
⑭ **REC indicator**
Lit when the REC button is pressed.

⑮ **Programme number indicator**
These lamps indicate the programme number into which a programme setting is being entered when setting the programmable timer.

⑯ **DAY indicator**
Shows the current day for the VTR clock and the day when the timer programme will begin.

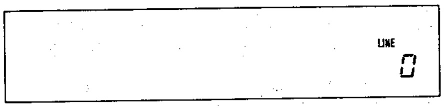
⑰ **VPS indicator (V-93G)**
Flashes when the VPS signal is being detected or lights when the VPS system is switched on.

REMOTE CONTROL UNIT



① **ON/STANDBY button**
This button is used to turn the VTR on and off.

② **Channel select buttons section**
10 keys: used to directly select the desired channel. When you select channels 1 to 9, combine the 0 key and any of the keys 1 to 9 to make channels such as 01, 02, 03 and so on.
Up/down buttons:
When the up button is pressed, the channel will change in the upper direction (higher channel). When the down button is pressed, the channel will change in the lower direction (lower channel).
Note:
When selecting audio and video signals from external audio and video equipments, select channel position 0 with the up/down buttons or 10 keys. The fluorescent display then shows as follows.



③ **Record buttons (REC)**
Press to start recording. The REC indicator comes on. When recording be sure to press the two buttons (right-hand and left-hand) simultaneously.

④ **Rewind button (REW)**
Press this button to rewind tapes rapidly. During the playback mode, pressing this button will allow you to play tapes in the reverse direction rapidly.

⑤ **PLAY button**
Press this button to play back pre-recorded cassettes with safety tab or restart playing back the pre-recorded cassettes without safety tab after the fully-automatic function was interrupted.

⑥ **Fast forward button (FF)**
Press this button to move tapes forward rapidly. During the playback mode, pressing this button will allow you to play tapes in the forward direction rapidly.

⑦ **STOP button**
Press this button to stop the tape.

⑧ **PAUSE/STILL button**
Used to operate in two different ways:
A) To temporarily stop the tape in the recording mode.
B) To view a still picture in the playback mode.

⑨ **FRAME button**
Use this button to advance the picture frame by frame in the still mode.

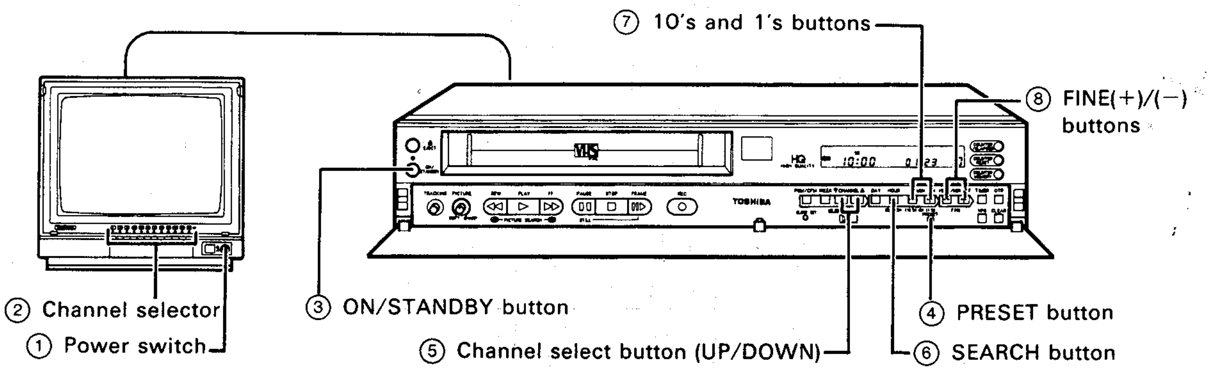
⑩ **SLOW buttons**
This button is used to slowly play back the picture at 1/3 times the speed of the normal playback.

⑪ **Two times speed playback button (× 2 ▶)**
When the button is pressed in the playback mode, the picture advances at two times the speed of the normal playback. During the two times speed playback, sound is heard and the picture is reproduced with noise.

⑫ **OTR button**
Used to operate the one touch timer recording in units of 30 minutes (up to 4 hours).

⑬ **TIMER buttons**
Used to make the VTR enter the timer mode, especially for the one touch timer recording.
When doing the timer recording, be sure to press the two buttons simultaneously.

CHANNEL SELECTION



⑦ 10's and 1's buttons
⑧ FINE(+)/(−) buttons
② Channel selector
① Power switch
③ ON/STANDBY button
⑤ Channel select button (UP/DOWN)
④ PRESET button
⑥ SEARCH button

***V-93G/W**

The tuner built in this VTR is capable of receiving V_L channels E2 to E4, X, Y, Z and V_H channels E5 to E12, S1 to S20 and UHF channels 21 to 69.

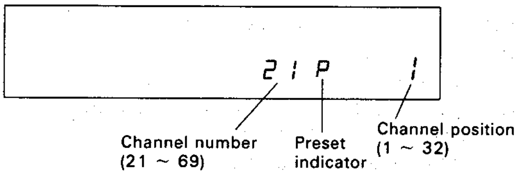
***V-93T**

The tuner built in this VTR is capable of receiving V_L channels A, B, C, X, Y, Z and V_H channels D to H_1, H_2, S1 to S20 and UHF channels 21 to 69.

Channels may be memorized in channel positions 1 to 32. When selecting a UHF/VHF station or changing to a preferred order, carry out the operation in numerical order as follows.

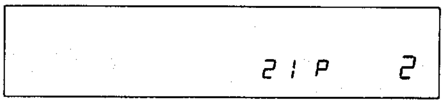
Example: Setting UHF station (ex. 26ch) in position 2

1. Turn on the power switch ① of the TV and set the VTR output channel on the TV channel selector ②.
2. Press the ON/STANDBY button ③ to ON (Light ON).
3. Open the door of the VTR front side.
4. Press the PRESET button ④.

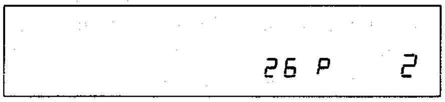


21 P 1
Channel number (21 ~ 69)
Preset indicator
Channel position (1 ~ 32)

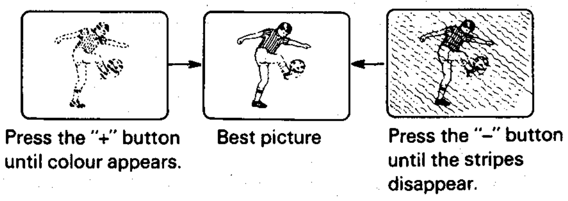
5. Set the channel position to be preset using channel select buttons (up/down) ⑤ or the 10 key on the remote control unit. .... "2"



6. Set the channel you wish to tune in.
   There will be two cases:
   (a) When you do not know the channel number you want to tune in:
   Press the SEARCH button ⑥.
   The channel will be up by one from lower channel 21. If the received signal is tuned in, scanning operation stops automatically.
   If the scanned channel is not that one you want to store into the tuned memory, press the SEARCH button ⑥ to restart channel search operation.
   (b) When you do know the channel number you want to tune in:
   Select the channel number using the 10's and 1's buttons ⑦.



7. Make fine adjustment using the FINE (+)/(−) buttons ⑧.

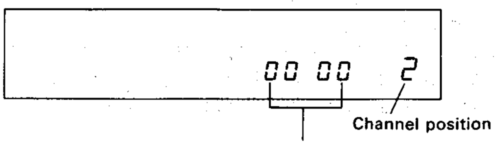


Press the "+" button until colour appears.

Best picture

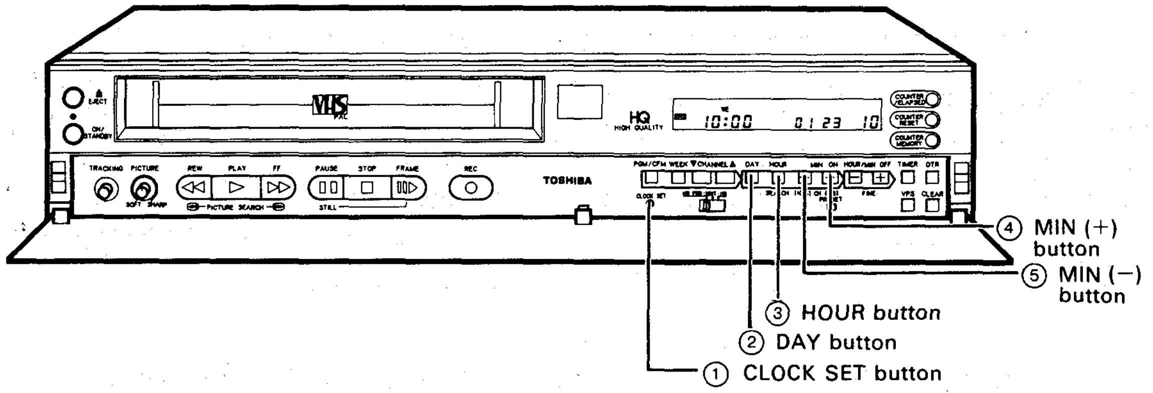
Press the "−" button until the stripes disappear.

8. Repeat steps 5 to 7 (up to 32 positions).
9. Press the PRESET button ④. When the button is pressed, the display enters the counter mode showing only channel position number.

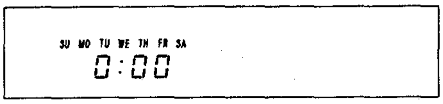


00 00 2
Channel position
Counter indicator

SETTING THE VTR CLOCK



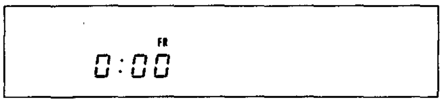
When the power lead is first connected to the AC outlet, or after an interruption of the power supply, the indication SU...SA 0:00 appears, flashing on the display as shown.



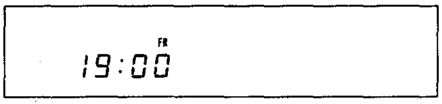
Example: To set for FR 19:25 (Friday, 19:25)

1. Press the CLOCK SET button ① to set the unit to the clock set mode.

2. Press the DAY button ② to set the day of the week .... "FR"



3. Press the HOUR button ③ to set the hour digits .... "19"



4. Press the MIN (+) button ④ to set the minute digits .... "25"

Notes:

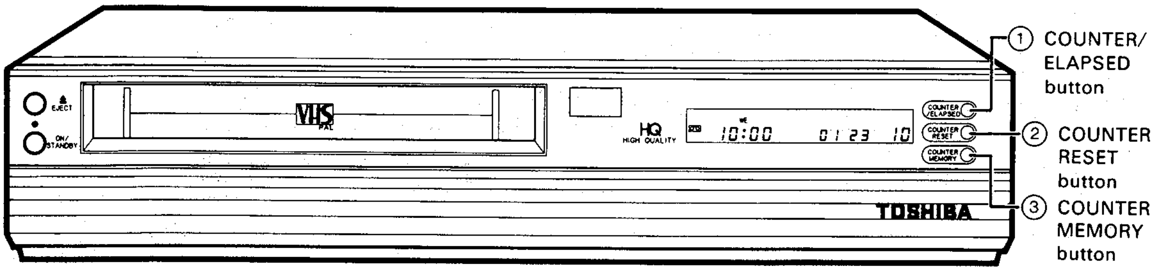
1. When the button is pressed once, the digit advances by one. When the button is kept pressed down, the minutes advance rapidly.
2. If you pass the desired time by mistake, use the MIN (−) button ⑤ to turn back the minutes.

5. Press the CLOCK SET button to display the current time. When the button is pressed, the clock starts from zero seconds.
   To synchronized the clock with the radio time signal, press the CLOCK SET button ① on the last pip of the hourly time signal.

Notes:

1. Be sure to set the current time before doing "TIMER RECORDING".
2. After power interruption, the fluorescent display changes in two ways: the colon (:) flashes, and the indication SU...SA 0:00 flashes. In former case, press the CLOCK SET button ① twice. In the latter case, reset the VTR clock to the current time and reset the programming data for the timer recording.

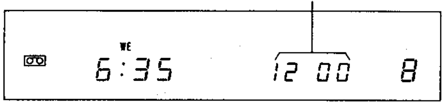
TAPE COUNTER


EJECT
ON/STANDBY
VHS
PAL
HQ
HIGH QUALITY
10:00
01 23
10
COUNTER/ELAPSED
COUNTER RESET
COUNTER MEMORY
TOSHIBA
① COUNTER/ ELAPSED button
② COUNTER RESET button
③ COUNTER MEMORY button

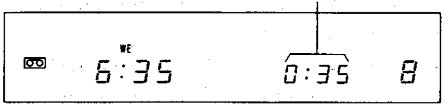
COUNTER/ELAPSED TIME OPERATION

The fluorescent display will either show the counter or the elapsed time when the COUNTER/ELAPSED button ① is pressed.

Counter display


WE
6:35
12 00
8

Elapsed time (ELAPSED) display

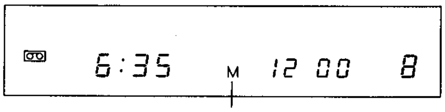


COUNTER RESETTING

At the beginning of the tape, press the COUNTER RESET button ②. This will set the counter to "0000". While recording or during playback, write down the programme recorded along with its corresponding counter numbers. Later, when using fast forward or rewind, you can easily find any sections desired.

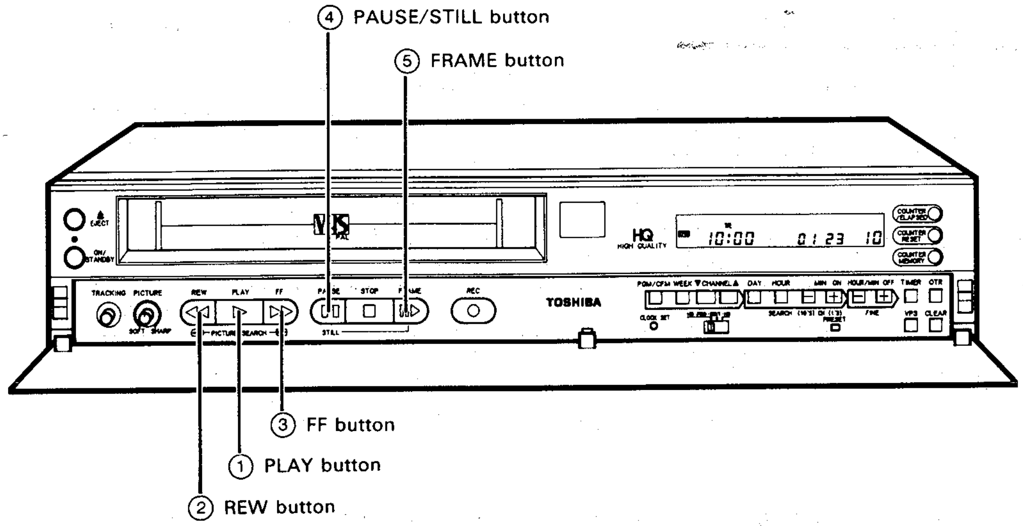
COUNTER MEMORY OPERATION

When the COUNTER MEMORY button ③ is pressed, the indicator "M" is displayed and the tape stops at a counter reading about "0000" during rewinding and fast forward modes. You now can return to the beginning of a recorded section quickly and easily.



Counter memory indication "M"

SPECIALIZED PLAYBACK



PICTURE SEARCH

1. Press the PLAY button ①.
2. When the REW button ② or FF button ③ is pressed the picture moves quickly (about 7 times the normal speed) in reverse or forward direction, and you can search for desired parts of a programme.

Notes:

- During the picture search operation, a few noise bars will go up and down on the playback picture.
- During the picture search operation, if the picture flows vertically on the TV screen, adjust the V-HOLD knob on the TV set.
- During the picture search operation, the sound will be muted.

STILL PICTURE

1. Press the PLAY button ①.
2. To stop the tape momentarily or to watch a still picture during playback, press the PAUSE/STILL button ④.
3. Press the PAUSE/STILL button ④ again to release the still picture and return to normal playback.

Notes:

1. The still mode will cease automatically after a lapse of approximately 5 minutes. The VTR will return to PLAY from STILL.
2. If noise appears in the center of the still picture, try moving the noise out of the way by pressing the FRAME button ⑤.

FRAME ADVANCE

1. Press the PLAY button ① (in play mode).
2. Press the PAUSE/STILL button ④ (in still mode).
3. Press the FRAME button ⑤.
4. Release the FRAME button ⑤ and then press the PAUSE/STILL button ④. The VTR returns to normal playback.

TWO TIMES SPEED PLAYBACK (AVAILABLE ONLY WITH THE REMOTE CONTROL UNIT)

Pressing the two times speed playback (X 2 ▶) button while in the playback mode, can perform the playback two times the normal playback. At this time, picture is reproduced with noise and sound can be heard. (Sound is not reproduced as it is.)

1. Press the "X 2 ▶" button on the remote control unit.
2. Press the STOP button on the VTR unit or the remote control unit to stop the two times speed playback.

Note:

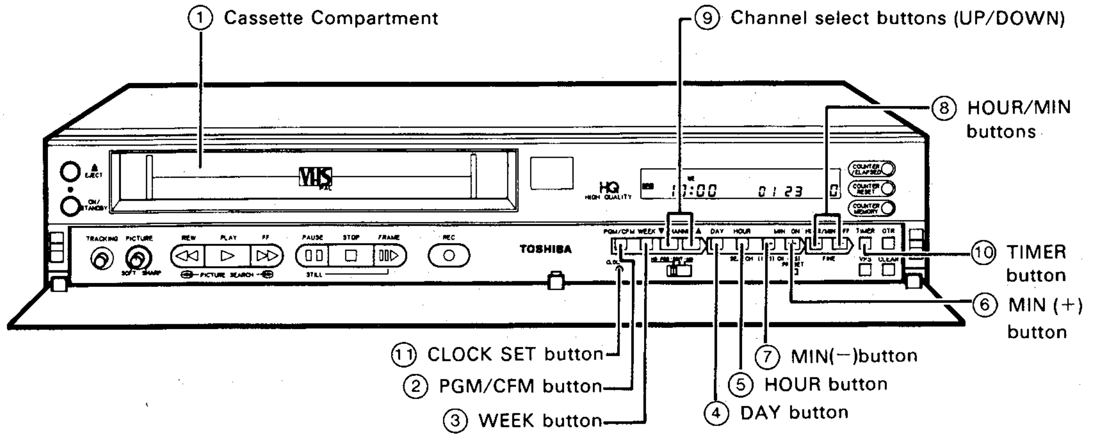
Even if you adjust the picture distortion on the TV by the V-Lock control, the vertical picture distortion still might occur depending on the TV's.

SLOW PLAY (AVAILABLE ONLY WITH THE REMOTE CONTROL UNIT)

Pressing the SLOW button permits you to play back the picture at 1/3 times the speed of the normal playback.

1. Press the PLAY button ① or PLAY button on the remote control unit.
2. Press the PLAY button on the remote control unit.
3. Press the PLAY button again to resume normal playback.

TIMER RECORDING

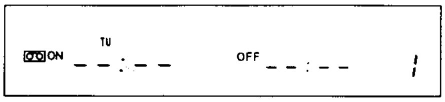

① Cassette Compartment
⑨ Channel select buttons (UP/DOWN)
⑧ HOUR/MIN buttons
⑩ TIMER button
⑥ MIN (+) button
⑪ CLOCK SET button
② PGM/CFM button
③ WEEK button
⑦ MIN(−)button
⑤ HOUR button
④ DAY button
TOSHIBA
HQ

The timer used in this VTR can preset four progrmmes for one day of the first week, one day of the next week, one day of the third week, the same day of every week, at the same time everyday.
The clock used is the 24-hour type. This VTR is capable of 21-day timer setting, and is designed to start timer recording when the TIMER button is pressed.
Five types of "day" setting are available in this VTR.

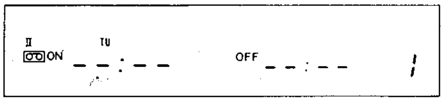
For example, if today is Tuesday, 7

SU (SUNDAY)	MO (MON-DAY)	TU (TUES-DAY)	WE (WEDNES-DAY)	TH (THURS-DAY)	FR (FRIDAY)	SA (SATUR-DAY)
			1	2	3	4
5	6	7	8	9	10	11
		←	1st week	→		
12	13	14	15	16	17	18
→	→	←	Next week	→		
19	20	21	22	23	24	25
→	→	←	Third week	→		
26	27	28	29	30	31	
→	→					

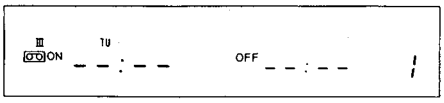
(1) 1st week "TU", 7th
(ineffective after execution)



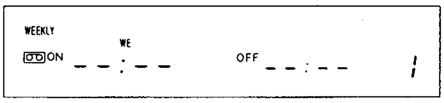
(2) Next week "II TU", 14th
(ineffective after execution)



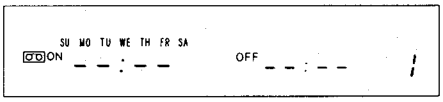
(3) Third week "III TU", 21st
(ineffective after execution)


III
TU
ON
– – : – –
OFF
– – : – –
/

(4) Weekly Wednesday "WEEKLY WE"
8
15
22
29
continues to the next month


WEEKLY
WE
ON
– – : – –
OFF
– – : – –
/

(5) Every day "SU, MO TU, WE, TH, FR, SA"


SU MO TU WE TH FR SA
ON
– – : – –
OFF
– – : – –
/

When the WEEK button is pressed, the WEEK indicator lights as follows:

II ⟶ III
↑
WEEKLY ←

When the day button is pressed, the day display changes as follows:

→ TU → WE → TH → – – – – → MO
↓
every day "SU. MO. TU. —SA"

Note: The day display from the current time.

OPERATION

1. Confirm the current time. If the current time is not correct, reset the current time.
2. Insert a cassette into the cassette compartment ①. (Check the cassette safety tab has not been removed.)
3. Specify the programme number (1 through 4) with the PGM/CFM button ②.
4. Press the WEEK button ③ if you want programmes for one day of the next week, one day of the third week or the same day of every week.

TIMER RECORDING

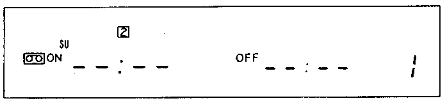
5. Set the day of the week with the DAY button ④.
6. Set the on time with the HOUR button ⑤, MIN (+) ⑥ and MIN (−) button ⑦.
7. Set the end time with the HOUR/MIN buttons ⑧.

   Notes:

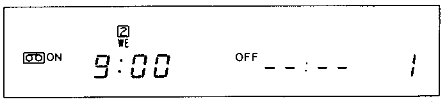
   1. 10-minute-digit is automatically carried to one-hour-digit when 10-minute-digit is over 60 minutes by continuously pressing the (+) button of the HOUR/MIN buttons.
   2. Use the (−) button to put back the timer end time.
8. Select the programme you want to see with the channel select buttons ⑨.
9. To continue to preset the programmes, repeat steps 3 to 8.
10. Press the TIMER button ⑩.

Example: To preset channel 25 in programme 2 from 13:00 to 13:15 of the next week on Tuesday. (Today is Wednesday at 9:00.)

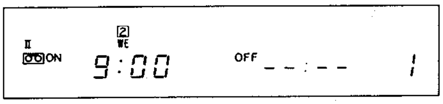
1. Press the PGM/CFM button ② to set "2" position.



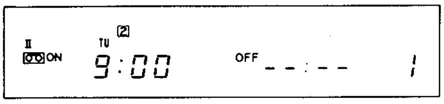
2. Press the WEEK button ③ once.
(The current time will be shown in the display.)



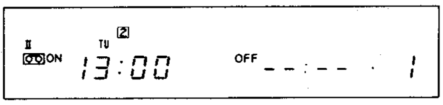
3. Press the WEEK button ③ again to display "II".



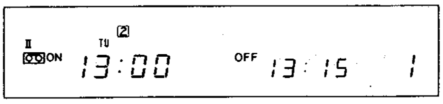
4. Press the DAY button ④ to set "II TU".



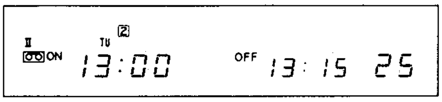
5. Press the HOUR button ⑤, MIN (+) ⑥ and MIN (−) ⑦ buttons to set the start time........................"13:00"



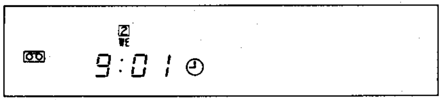
6. Press the HOUR/MIN buttons ⑧ to set the end time..."13:15"



7. Press the channel select button ⑨ to select the desired channel...25
(In this case, you can directly select the desired channel with the remote control unit.)



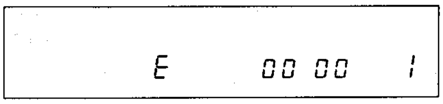
8. Press the TIMER button ⑩.



(The VTR clock works during timer setting.)

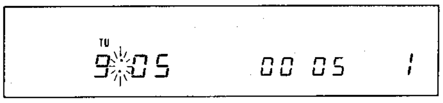
Notes:

1. When no cassette is loaded, timer recording is not possible.
In this case, the "E" indicator is displayed while the TIMER button ⑩ is pressed.



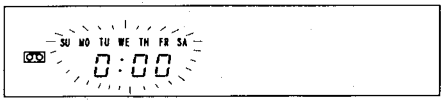
2. If the cassette tab has been removed, timer recording is also not possible. At this time, the cassette is ejected automatically.
3. During timer recording, the preset contents (programme number, channel, day of the week or timer on/off time) cannot be changed.
4. The end time can be preset every 30 minutes with the OTR button.
5. Programme settings remain in effect until they are executed.
6. After a power interruption, the fluorescent display is as shown below.

(1)



In this case, the contents of the programmes remain in effect. Press the CLOCK SET button ⑪ to confirm the current time is correct. Press it again to set the current time.

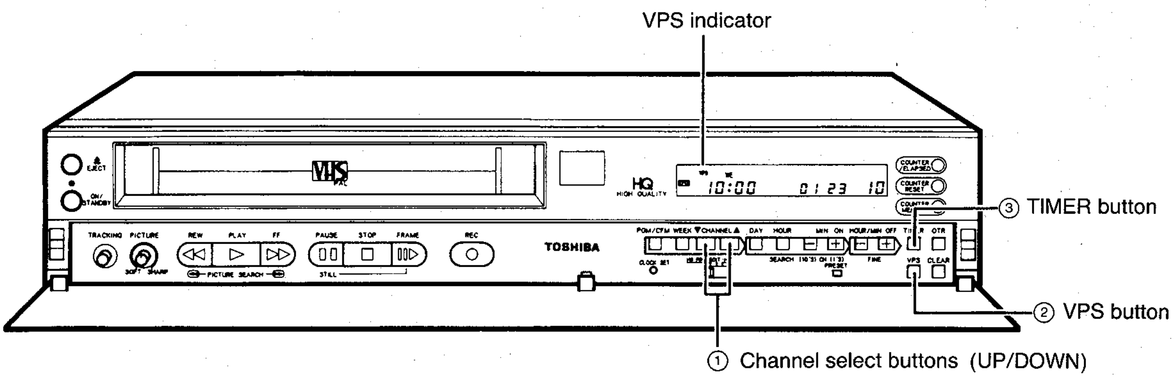
(2)



In this case, the preset programmes become ineffective. Reset the VTR clock to the current time and do the programme setting from the beginning.

7. To proceed to another programme setting at step 7, press the PGM/CFM button ②.
8. Timer setting is possible even in standby mode.

VPS RECORDING (V-93G)



What is VPS?

VPS is the abbreviation for Video Programme System and was created to fully record television programmes having VPS signals from start to end even if your desired television programme's start time is changed or rescheduled. This system is currently adopted in all areas of West Germany. The followings should be taken into consideration when making VPS timer programming.

1. Be sure to confirm the VPS television programmes are cast on air in your area.
2. Is your VPS signal received in your area weak?
3. This VTR is set to ON (VPS indicator lit) as for the VPS function. Before starting the VPS recording, be sure to confirm the VPS indicator is lit.
4. Ensure the VTR clock time is correct.
5. Preset the timer programming for your desired VPS television programme.

In case the VPS timer programming data and normal timer programming data are overlapped

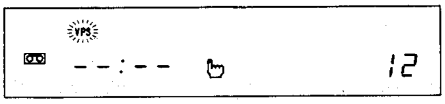
The VPS programming data always take priority over other timer programming data. If you want to preset a television programme at a time of which in the vieinity a VPS programme will be broadcast, press the VPS button to release the VPS function.

VPS One-Touch Timer Recording

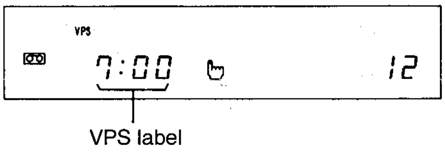
Example:

Today is Sunday, at 7:10 o'clock to record channel 12 for VPS recording.

1. Selected the desired channel with the channel select buttons (UP/DOWN) ① or the 10 keys on the remote control unit.
2. Press the VPS button ②.
   The following will be indicated on the display while the VPS signal is being detected.



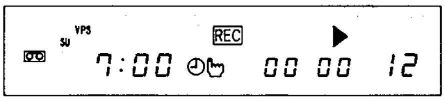
When the VPS is on, the display will be changed to:



Notes:

1. When the VPS signal is not detected and the VPS is off, the "E" mark will be shown in the display.
2. "7:00" shown in the fluorescent display is a VPS label for the TV programme being received.

3. Press the TIMER button ③within nine seconds after the VPS is switched on.

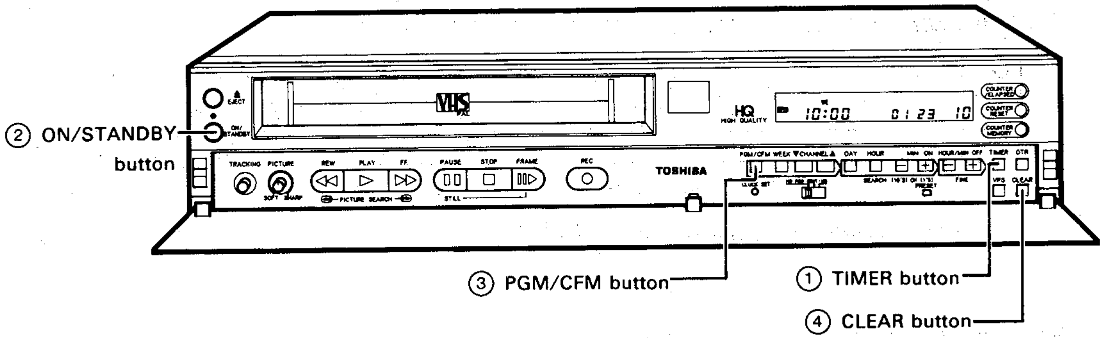


The VPS OTR then starts, and recording will be continued until the label for that programme stops sending.

Note:

Note that when you wish to perform VPS timer recording for several programmes, the timer preset function will not handle the other programmes in the memory until recording of the programme which is being recorded first is completed. Because, of this, when timer recording times overlap, the programme that was preset first takes priority over the others.

ADDITIONAL INFORMATION FOR TIMER RECORDING


② ON/STANDBY button
③ PGM/CFM button
① TIMER button
④ CLEAR button
TOSHIBA
HQ
VHS

TO USE THE VTR AFTER SETTING THE PROGRAMMABLE TIMER

1. Press the TIMER button ① to release the timer mode.
2. Press the ON/STANDBY button ② to turn on the VTR.
3. After use, be sure to press the PGM/CFM button ③ to verify the contents of the stored programmes.
4. To enter the timer mode again, press the TIMER button ①.

TO CANCEL THE TIMER PROGRAMME

1. Press the PGM/CFM button ③ to display the programme number to be cancelled.
2. Press the CLEAR button ④. The timer off time and channel are also erased.

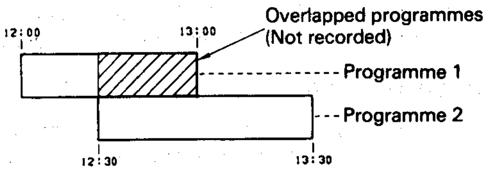
TO CHECK THE TIMER PROGRAMME

It is very useful to make a schedule for timer programmes so that you can know the contents of the stored programmes. The following method is available to check the data preset in the timer programme.

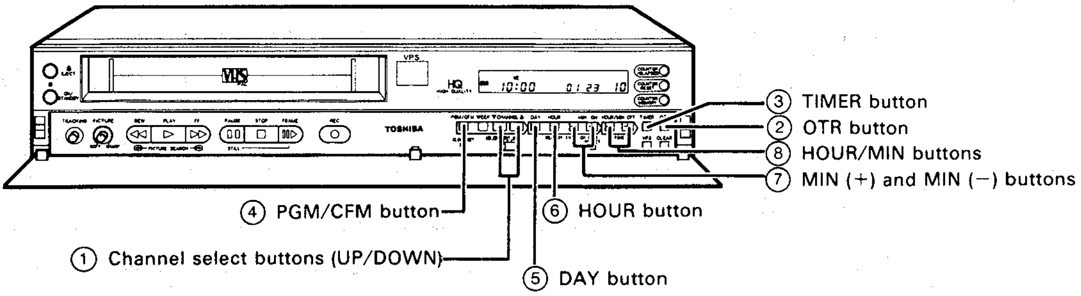
1. Press the PGM/CFM button ③.
   The contents of the programmes 1 through 4 (start time and end time) that were previously stored, will be displayed on the fluorescent display continuously.

PROGRAMME OVERLAPPING

Be careful not to overlap the preset times.
If you happen to overlap the preset programmes, start time has priority in execution, and the overlapped programme will not be recorded. See figure below.


12:00
13:00
Overlapped programmes
(Not recorded)
Programme 1
Programme 2
12:30
13:30

ONE TOUCH TIMER RECORDING

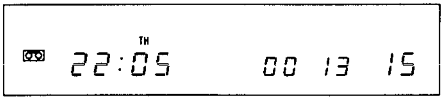

③ TIMER button
② OTR button
⑧ HOUR/MIN buttons
⑦ MIN (+) and MIN (−) buttons
④ PGM/CFM button
⑥ HOUR button
① Channel select buttons (UP/DOWN)
⑤ DAY button
TOSHIBA
HQ
10:00
0 1 23 10

This VTR unit features a one touch recording (OTR) function. This function allows you to record at 30 minute periods, for up to 4 hours.
After the recording is completed, the power goes off automatically.
Also, when setting the timer, the off time can be set at 30 minute periods. The One Touch Recording (OTR) mode takes priority over other VTR operation modes. For example, when the OTR mode is activated while the VTR is in the timer mode, the VTR will automatically return to the timer mode after the OTR mode is completed. Thus, it is possible to have 5 different timer recordings.

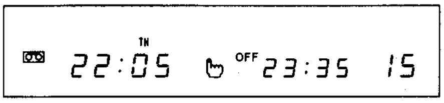
OTR OPERATION

Example: To record channel 15 starting from now for 1-1/2 hours at a current time on Thursday, 22:05

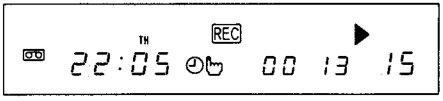
1. Select channel 15 by pressing channel select buttons (up/down) ①.


TH
22:05
00 13 15

2. Press the OTR button ② to set the recording time.
   When the OTR button ② is pressed once: 22:35 (30 minutes)
   When the OTR button ② is pressed twice: 23:05 (1 hour)
   When the OTR button ② is pressed three times: 23:35 (1 hour and 30 minutes)


TH
22:05
OFF 23:35
15

3. Press the TIMER button ③ within 9 seconds.


TH
REC
22:05
00 13 15

Notes:
1. Thirty minutes are added every time the OTR button ② is pressed, for up to 4 hours (eight times). (The one touch timer can only be set in 30-minute units.)
2. One touch timer operation impossible only when power is on and the VTR is in the clock mode.
3. The one touch timer function has priority over any other operation function (play back, recording, timer, etc.)

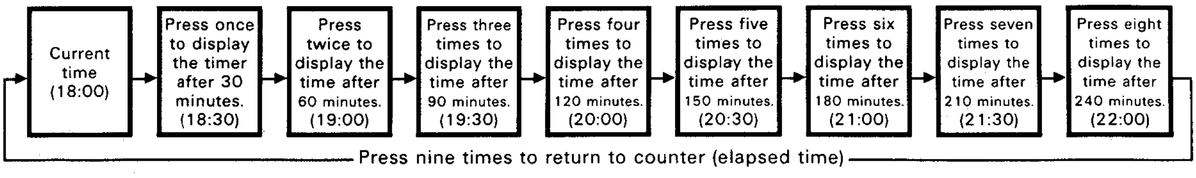
TO SET THE TIMER OFF TIME WITH THE OTR BUTTON

Example: To set channel 18 starting from Saturday, 20:02 for 1 hour to programme 1 at a current time of Tuesday, 8:21

1. Confirm the current time. If the current time is not correct, set the current time again (see page 11).
2. Insert a cassette into the compartment. (Check the cassette safety tab has not been removed).
3. Specify the programme number (1 through 4) with the PGM/CFM button ④ ...."PGM 1"
4. Set the day of the week with the DAY button ⑤ ...."SA"
5. Set the recording start time with the HOUR button ⑥ and MIN (+) and MIN (−) buttons ⑦ to 20:02.
6. Press the OTR button ② three times.
7. Select the desired channel 18 with the channel select buttons (up/down) ① or use the remote control unit to directly select the desired channel.
8. Press the TIMER button ③ to complete the timer setting.
9. The "TIMER" indicator lights.
10. Press the TIMER button ③ to complete the timer setting.

Error indication

When the TIMER button ③ is pressed without setting timer on/off time, or without a cassette in the compartment, the "E" indicator lights (while the TIMER button ④ is pressed).


Current time (18:00)
Press once to display the timer after 30 minutes. (18:30)
Press twice to display the time after 60 minutes. (19:00)
Press three times to display the time after 90 minutes. (19:30)
Press four times to display the time after 120 minutes. (20:00)
Press five times to display the time after 150 minutes. (20:30)
Press six times to display the time after 180 minutes. (21:00)
Press seven times to display the time after 210 minutes. (21:30)
Press eight times to display the time after 240 minutes. (22:00)
Press nine times to return to counter (elapsed time)

CIRCUIT DESCRIPTIONS

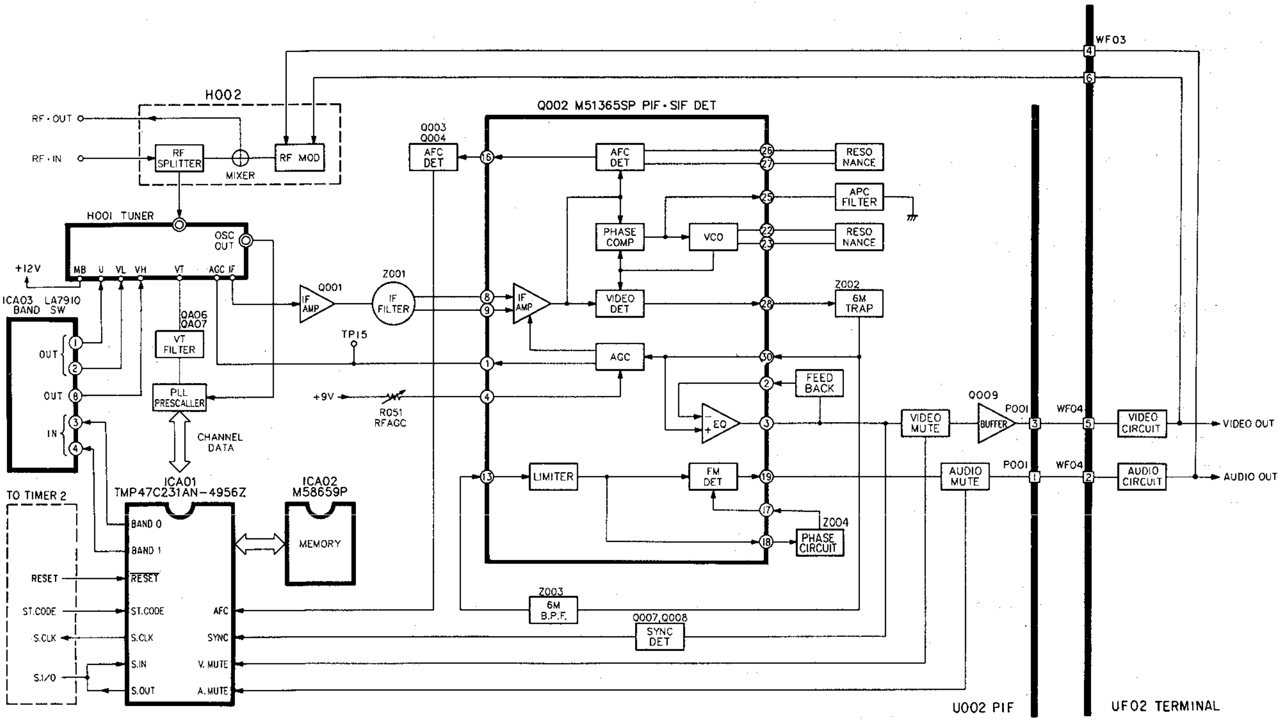
1. RF and Receive Circuit

1-1. Outline

1. The receive circuit consists of an ANT input/output circuit, channel selection circuit, PIF and SIF circuits. The receiving circuit selects a desired broadcast signal from TV signals induced on an antenna and sends stable video signal and audio signals obtained by processing received signals to the video and audio circuits.
2. The output signals from the video and audio circuits are converted into a conventional TV signal for one of channels 31 to 39 by an RF modulator so that the converted signal can be received by a conventional TV receiver.

1-2. ANT input & output circuits

1. In this unit an RF signal splitter, mixer and the RF modulator have been moduled as one unit.
2. The RF splitter splits TV input signals from the antenna into two: and sends one of them to the tuner's RF input terminal and another to the mixer.
3. The RF splitter output and the RF modulator output are mixed in the mixer circuit, and resultant output is used as an RF output. To discriminate the RF modulator output from the antenna input signals, a test signal generator has been provided in the modulator. The modulator is designed so that its output channel can be varied with a control VC to prevent the antenna signals from interference.



H002
RF・OUT
RF・IN
RF SPLITTER
MIXER
RF MOD
H001 TUNER
OSC OUT
+12V
MB
U
VL
VH
VT
AGC
IF
ICA03 LA7910 BAND SW
OUT
OUT
IN
1
2
8
3
4
QA06 QA07
VT FILTER
PLL PRESCALLER
CHANNEL DATA
TO TIMER 2
RESET
ST.CODE
S.CLK
S.I/O
ICA01 TMP47C231AN-4956Z
BAND 0
BAND 1
RESET
ST.CODE
S.CLK
S.IN
S.OUT
AFC
SYNC
V. MUTE
A. MUTE
ICA02 M58659P
MEMORY
Q001
IF AMP
Z001
IF FILTER
TP15
+9V
R051 RFAGC
Q003 Q004
AFC DET
Q002 M51365SP PIF・SIF DET
16
8
9
1
4
13
IF AMP
AFC DET
PHASE COMP
VCO
VIDEO DET
AGC
EQ
LIMITER
FM DET
26
27
25
22
23
28
30
2
3
19
17
18
RESO NANCE
APC FILTER
RESO NANCE
Z002
6M TRAP
FEED BACK
Z004
PHASE CIRCUIT
Z003
6M B.P.F.
Q007,Q008
SYNC DET
VIDEO MUTE
AUDIO MUTE
Q009
BUFFER
P001
P001
3
1
WF03
4
6
WF04
WF04
5
2
VIDEO CIRCUIT
AUDIO CIRCUIT
VIDEO OUT
AUDIO OUT
U002 PIF
UF02 TERMINAL

Fig. 1-1 PIF block diagram (V-93W)

1-3. PIF circuit

1. A newly developed PLL sync detection type IC (IC002, M51365SP) is used in the PIF circuit. A block diagram of the IC is given in Fig. 1-2.
2. TV signals from the ANT circuit enter the tuner. The tuner develops an IF signal corresponding a channel selected by the selector. The IF signal is amplified by Q001 and the amplified output enters pins 8, 9 of IC001 through a PSF (Picture Saw Filter, Z001). The IF signal is amplified again inside the IC and then enters a video detector and detected. (On the PLL sync detection, which is a feature of the IC, detailed description will be given later.)
3. The detected video signal outputs from pin 28, passes Z003 (5.5 MHz trap), enters pin 30 where the signal is amplified by a negative feedback equalizer amplifier, and then outputs from pin 3. The pin 3 output passes through Q009 buffer and enters the video circuit on the main unit through pin 3 of P001.

1-4. PLL sync detection system

1. The PLL sync detection system will be given in comparison with a conventional pseudo sync detection system.
   In the pseudo sync detection system, the IF signal sent from the tuner enters a sync detector in passing through a SAW filter and IF amplifier as shown in Fig. 1-3. With the sync detection system employed, the sync carrier signal is reproduced by a tank circuit tuning in the limiter circuit and P-carrier frequency in the input signal.
2. On the other hand, in the PLL sync detection system, the sync carrier signal is developed in different way. That is, the carrier signal is developed by using the VCO (Voltage Controlled Oscillator) output inside the IC. The VCO circuit constitutes a PLL loop with the APC DET (phase comparator) so that it can be locked to the P-carrier signal from the tuner. Since the loop filter of the PLL circuit is set to approx. 100 kHz, phase modulation components caused at rising part of waveform, etc. are removed, thus lowering waveform distortion more than that of the pseudo sync detection system.
3. Moreover, the PLL sync detection system is superior in DG, DP, cross color, and linearity to those of the pseudo sync detection system.

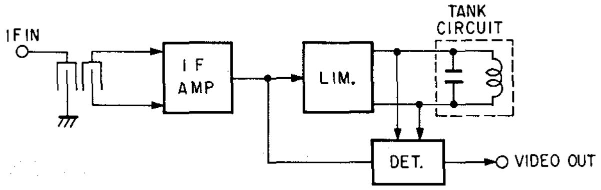

IF IN
I F AMP
LIM.
TANK CIRCUIT
DET.
VIDEO OUT

Fig. 1-3 Pseudo sync detector

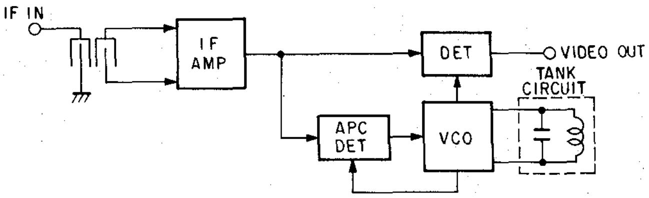

IF IN
I F AMP
DET
VIDEO OUT
TANK CIRCUIT
APC DET
VCO

Fig. 1-4 PLL sync detector

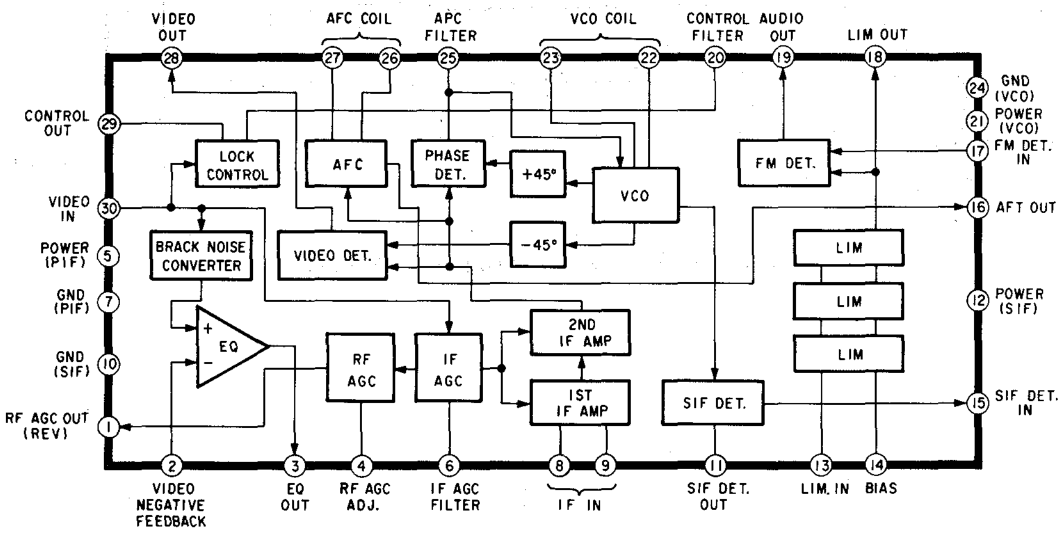

VIDEO OUT 28
AFC COIL 27 26
APC FILTER 25
VCO COIL 23 22
CONTROL FILTER 20
AUDIO OUT 19
LIM OUT 18
GND (VCO) 24
POWER (VCO) 21
FM DET. IN 17
AFT OUT 16
POWER (SIF) 12
SIF DET. IN 15
CONTROL OUT 29
VIDEO IN 30
POWER (PIF) 5
GND (PIF) 7
GND (SIF) 10
RF AGC OUT (REV) 1
VIDEO NEGATIVE FEEDBACK 2
EQ OUT 3
RF AGC ADJ. 4
IF AGC FILTER 6
IF IN 8 9
SIF DET. OUT 11
LIM. IN 13
BIAS 14
LOCK CONTROL
AFC
PHASE DET.
+45°
VCO
FM DET.
BRACK NOISE CONVERTER
VIDEO DET.
-45°
LIM
LIM
LIM
EQ
RF AGC
IF AGC
2ND IF AMP
1ST IF AMP
SIF DET.

Fig. 1-2 M51365SP Internal block diagram

1-5. SIF circuit

The video signal output from pin 28 is applied to a 5.5 MHz BPF (Z003) where an audio inter carrier signal is extracted. The audio signal enters pin 13 of IC002, passes a limiter circuit, frequency-demodulated, and outputs from pin 19. Thus developed audio output is fed to the audio circuit through pin 1 of P001.

1-6. Channel selection circuit

1-6-1. Outline

A frequency synthesizer (FS) system is employed in the channel selection circuit to more stabilizing receive frequencies. The channel selection system consists of a FS microcomputer ICA01 (TMP47C231AN), PLL IC ICA04 (TD6350P) with a built-in prescaller, non volatile memory ICA02 (M58659P) which stores tuning data, and associated circuits.

1-6-2. Functions

The FS microcomputer always accepts key data such as a channel position number, mode status data, etc. from the timer microcomputer through three serial transmission lines, and performs required operations based on the data it received. The FS microcomputer has no direct key input ports, but is controlled through the timer microcomputer.

(1) Channel preset mode

Pushing the preset switch on the front panel activates the channel preset mode and the display tube changes from counter display mode to the preset display mode. Desired channels can be stored in this mode, and one of the channels memorized is selected by specifying a desired position number in the ordinary operation mode. As channel selection methods, there are three kinds: search-up selection, direct selection, and MFC (Manual Fine Channel) selection, each of which has following features:

* **Search UP selection**
Sync pulse output signal and AFC detection signal from the PIF circuit are used to detect presence of a signal and its center frequency, thereby allowing reception of a desired signal precisely. When the system enters the preset mode and the SEARCH key is first pushed, the search operation always starts from the first channel (E2). However, when search-up selection is performed after a direct channel selection, the channel selection is carried out from the channel selected last. Signal detection range for each channel is approx. ±4 MHz.

* **Direct selection**
In this system, 10's digit and 1's digit are set separately. Each number is incremented by one step each time the key is pushed. Pushing the key continuously increments channels at a rate of 700ms/CH.

* **MFC selection**
If a desired channel can not be received with signal interference, etc., the receive frequency can be varied by using the FINE (-)(+) keys. Minimum resolution is 62.5 KHz/step, or 150ms/1 step for continuous pushing. Maximum MFC variable range is ±4 MHz. (The last frequency received is maintained when reception is made again.)

(2) CH memory writing

In the preset mode, memorization operation is performed each time a channel is set, so no memory key is provided. In a conventional system, if all 32 positions are assumed to be memorized, 32 times of key operations are needed. However, in the VTR, a channel is automatically memorized each time the channel is preset, so no memory key is provided, thus eliminating troublesome key operations considerably.

(3) Ordinary operation mode

In ordinary use, channel selection is carried out by position numbers. The AFC function which detects presenece of signal each time a position is changed, but it does not work for points memorized by the MFC selection method.

1-6-3. Circuit operation

1. In the frequency synthesizer type channel selection circuit, a signal corresponding to a tuning frequency of the ET tuner is picked up from the local oscillator, and the signal is counted down to a 1/n in passing through a divider with division ratio of n, where n is a division ratio corresponding to the tuning frequency (receive channel). And the counted down frequency and a signal which is also prepared by counting down a precision, fixed frequency reference oscillator signal are compared in their phase, and the tuning voltage is controlled by a voltage proportional to the phase difference of the two signals, thereby keeping the receive frequency at a specified value precisely. This closed loop is called a "PLL".

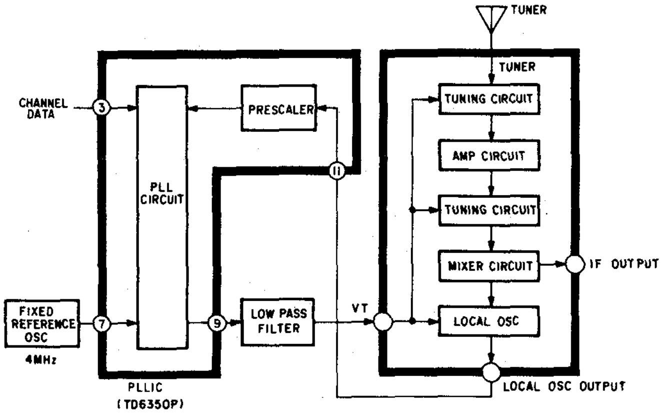

TUNER
TUNER
CHANNEL DATA
3
PRESCALER
11
PLL CIRCUIT
TUNING CIRCUIT
AMP CIRCUIT
TUNING CIRCUIT
MIXER CIRCUIT
IF OUTPUT
FIXED REFERENCE OSC
4MHz
7
9
LOW PASS FILTER
VT
LOCAL OSC
LOCAL OSC OUTPUT
PLLIC (TD6350P)

Fig. 1-5 System block diagram

2. In practice the selection circuit operates as follows:
   a. First the timer microcomputer sends position data in serial format to the FS microcomputer.
   b. Channel data are read out from the CH memory IC (ICA02) according to the position data. Next, frequency data are read out by the FS microcomputer according to the CH data and the data are transferred to the PLL prescaller IC (ICA04).
   c. The PLL prescaller changes output current at its pin 9 so that frequency of the local oscillator output signal in the ET tuner and frequency from the FS microcomputer coincides. The output current at pin 9 is led to an active filter (QA06, QA07), converted into a DC voltage, and then applied to the tuning voltage terminal of the tuner. Since the loop is closed, the local oscillator frequency of the tuner is fixed at a predetermined frequency.
   d. When the power is turned on or channel position is changed, the FS microcomputer develops video and audio mute signals from its pins 3 and 4, respectively. The muting time is 100ms for the video signal, and 200ms after completion of the AFT operation for the audio signal. The muting time is 300ms for any signals in the MFC mode.

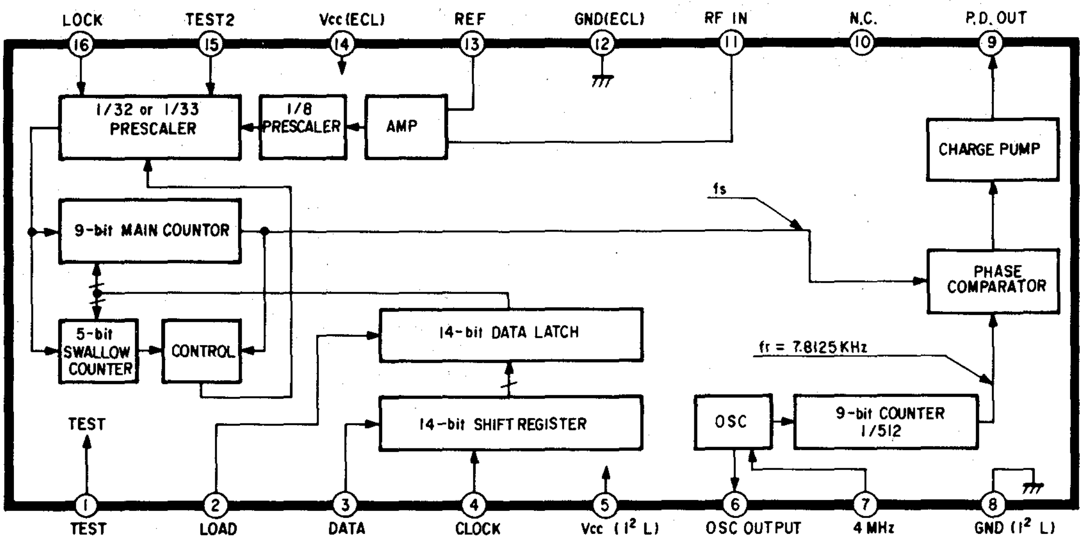

LOCK
TEST2
Vcc(ECL)
REF
GND(ECL)
RF IN
N.C.
P.D.OUT
16
15
14
13
12
11
10
9
1/32 or 1/33 PRESCALER
1/8 PRESCALER
AMP
CHARGE PUMP
fs
9-bit MAIN COUNTOR
PHASE COMPARATOR
5-bit SWALLOW COUNTER
CONTROL
14-bit DATA LATCH
fr = 7.8125KHz
TEST
14-bit SHIFT REGISTER
OSC
9-bit COUNTER 1/512
1
2
3
4
5
6
7
8
TEST
LOAD
DATA
CLOCK
Vcc (I² L)
OSC OUTPUT
4 MHz
GND (I² L)

Fig. 1-6 TD6350P Internal block diagram

2. Servo Circuit

2-1. Outline

A new digital servo IC (TD6361N-D5) which plays central roles in the servo operation is employed in the servo circuit. The servo IC includes:

1. Cylinder servo circuit which controls speed and phase of video heads.
2. Capstan servo circuit which controls tape speed at a specified value, thereby allowing the video heads to precisely trace video tracks.
3. Noise bar shift circuit using a pulse signal to drive the capstan.
4. Tracking switching circuit used in the slow playback and double speed playback operations.
5. V-sync separation circuit, various amplifiers, Schmitt circuits.
6. Synchronous editing circuit.
7. Pseudo V-sync signal generation circuit.

2-2. Servo IC

The servo IC TD6361N-D5 is a 42-pin, shrink type IC developed for VHS format VTRs and has following functions:

1. Cylinder system process circuits:
   Phase detection, speed detection, reference signal generation circuits.
2. Capstan system process circuits:
   Phase detection, speed detection, reference signal generation circuits.
   Mixing amplifier with loop gain automatic correction circuit.
3. Capstan speed control circuit for playbacks in slow, double speed, and 7 times speed mode, and cylinder fH correction circuit.
4. Schmitt amplifiers for PGs
5. Control signal recording current source
6. Pseudo V-sync signal generation circuit.
7. Synchronous editing function
8. Reference signal generation circuit

The TD6361N-D5 differs from the conventional servo IC TD6360P in that:
The mixing amplifier loop gain automatic correction circuit is added and mode designation is conducted by parallel data inputs through pins 28 to 33.
Table 2-1 shows the mode designation.

Table 2-1 Servo IC mode table

Pin No.	**28**	**29**	**30**	**31**	**32**	**33**	**3**
Pin Name	**VP ON**	**M1**	**M2**	**REV/ FWD**	**S1**	**S2**	**TRK FIX**
REC	L	H	L	L	L	L	H
SYNC. EDITING	L	H	H	L	L	L	H
PLAY	L	L	H	L	L	L	H
x 2	H	L	H	L	H	L	H
CUE	H	L	H	L	L	H	H
REV	H	L	H	H	L	H	H
SLOW	M	L	H	L	L	L	L

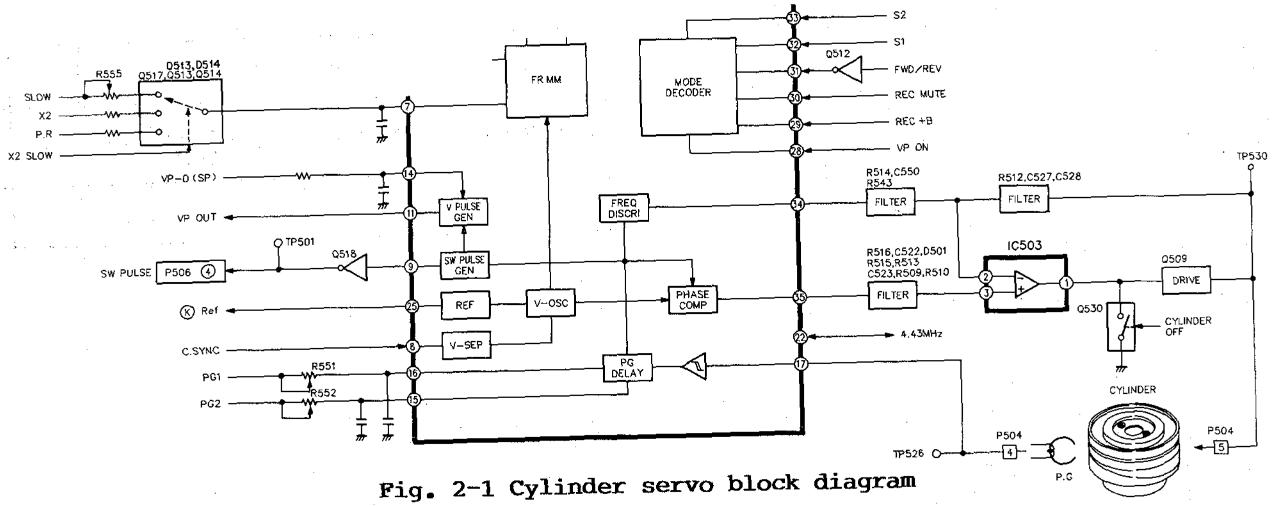
H: HIGH voltage level (5V)
L: LOW voltage level (0V)
M: MIDDLE voltage level (2.5V)

2-3. Cylinder servo circuit

The cylinder servo circuit is provided to precisely record video signals on specified track patterns in the record mode, and to trace the recorded patterns correctly in the playback mode by controlling revolution speed and revolution phase of the video heads.

2-3-1. PG/SW pulse generation circuit

1. The PG pulses are generated by detecting revolution of PG magnets mounted under the cylinder with fixed PG heads. Location of the PG pulses is set so that it precedes approx. 1.7ms from a head switching point when the servo is locked. Fig. 2-1 shows a block diagram of the servo circuit and Fig. 2-2 indicates a timing chart.



SLOW
X2
P.R
X2 SLOW
R555
Q517,Q513,Q514
D513,D514
VP-D (SP)
VP OUT
TP501
Q518
SW PULSE
P506 ④
Ⓚ Ref
C.SYNC
PG1
PG2
R551
R552
V PULSE GEN
SW PULSE GEN
REF
V-SEP
FR MM
V-OSC
FREQ DISCRI
PHASE COMP
PG DELAY
MODE DECODER
S2
S1
Q512
FWD/REV
REC MUTE
REC +B
VP ON
R514,C550
R543
FILTER
R512,C527,C528
FILTER
TP530
R516,C522,D501
R515,R513
C523,R509,R510
FILTER
IC503
Q509
DRIVE
Q530
CYLINDER OFF
4.43MHz
CYLINDER
P504
P504
TP526
P.G

Fig. 2-1 Cylinder servo block diagram

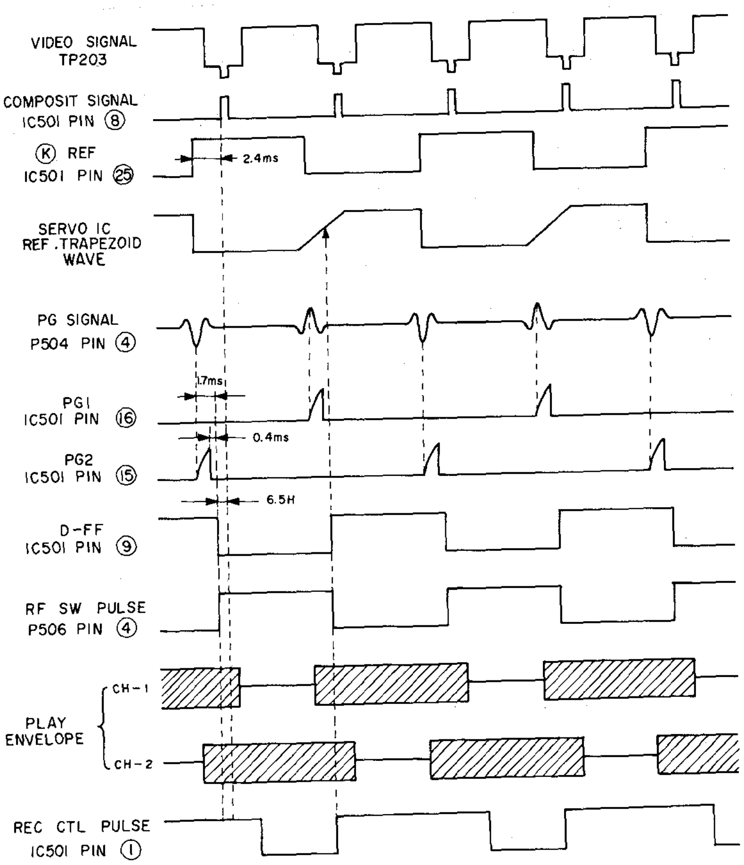


Fig. 2-2 Cylinder servo timing chart

2. A PG signal induced on a PG head enters pin 17 of IC501 through C530. Pin 17 of IC501 is biased with a voltage of approx. 2.25V. The PG signal is delayed by a time constant circuit (R551, R531, C504 for PG1, R552, R532, C503 for PG2) external IC501. With the delayed PG signal, a flip-flop inside the IC is triggered and the flip-flop develops switching pulse at pin 9 of IC501. The switching pulse is fed to the video circuit through Q518 inverter circuit. Amount of delay for the PG signal is set to 0.4ms (provided inside the IC) plus time constant provided by external time constant circuit.

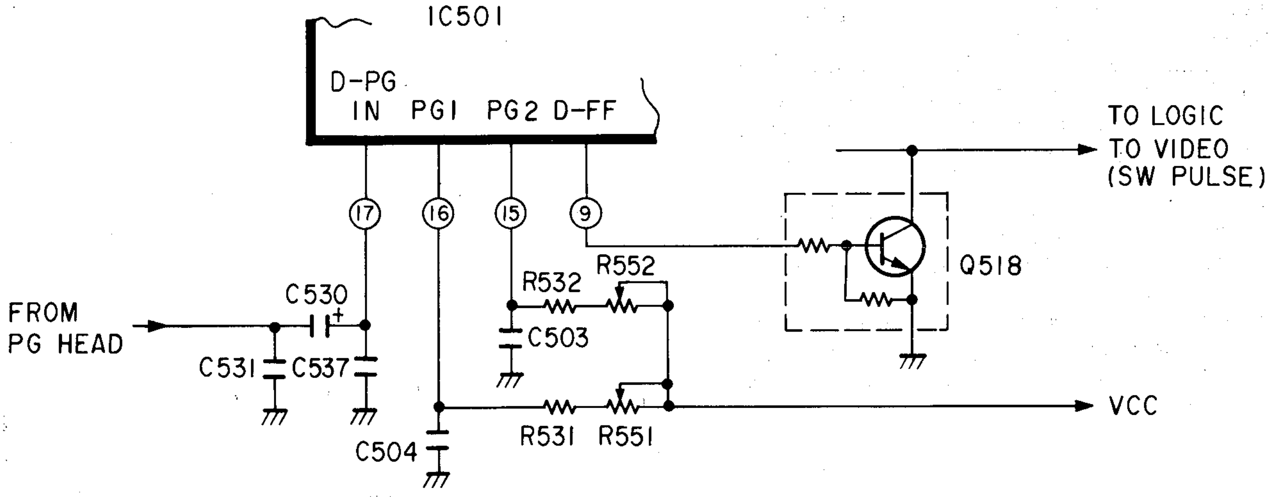


Fig. 2-3

2-3-2. Phase detection (APC) and speed detection (AFC) circuits

1. Phase and speed detections are performed inside IC501. In the phase detection circuit, phase at rising part of the switching pulse developed from the PG pulse stated above and phase of the reference signal(25 Hz signal) are compared.
2. In the record mode a V-sync signal entered pin 8 of IC501 is counted down to 1/2 and this is used as the reference signal. On the other hand, in the playback mode, 4.43 MHz clock signal entered pin 22 of IC501 is counted down to 25 Hz and this is used as the reference signal. This is the only difference between the record and playback modes in the cylinder servo circuit.
3. In the speed detection circuit, time difference comparison (speed comparison) is carried out between rising and falling edges of the switching pulses. Each of phase and speed detection output is subject to pulse width modulation (PWM) of approx. 35 KHz and outputs from pins 35 and 34 of IC501 as a PWM square wave pulse.
4. When the servo circuit is in locked, stable condition, the PWM pulse has approx. 50% duty. While the stable condition is upset and speed is varying, the duty deviates excessively. And in the worst case the output shows high or low level. However, the APC output at pin 35 of IC501 develops 50% duty pulse if the speed deviates excessively and the AFC shows high or low level.

2-3-3. Phase compensation and output amplifier circuits

1. The APC output developed at pin 35 of IC501 passes through a filter and phase compensation circuits (R516, C522, R515, R513, C523, R509, R510) provided to stabilize the servo characteristics and to smooth PWM carrier (35kHz) and enters pin 3 of IC503 op-amplifier. A bi-directional diode (D501) connected in parallel with R515 functions to speed up the response by rapidly charging or discharging C523.
2. On the other hand, the AFC output from pin 34 of IC501 enters a filter circuit (R514, C550, R543) which removes PWM carrier components, and the filter output enters pin 2 of IC503. The carrier components in the AFC output is attenuated by a feedback capacitor C528 connected to pin 2 of IC503. R512 and C527 determines gain of the op-amplifier as well as operate as an APC and AFC filter.
3. The op-amplifier output enters the base of Q509 drive transistor and drives the cylinder motor. The cylinder is stopped as follows:
   The logic microcomputer develops a cylinder OFF signal (HIGH) at its pin 27 of IC601 and Q530 turns ON, lowering the base bias of Q509 LOW.

2-3-4. fH correction circuit

1. In the slow, double speed, and cue/review modes, tape speed varies. Accordingly, it is necessary to control revolution speed of the cylinder to obtain horizontal sync signal frequency (fH) of 15.625 KHz by maintaining relative tape speed at a specified value between the cylinder and the tape.
2. The servo IC TD6361N-D5 automatically increases or decreases the cylinder speed depending upon the tape speed in the slow, double speed, cue/review modes, thus performing the fH correction.

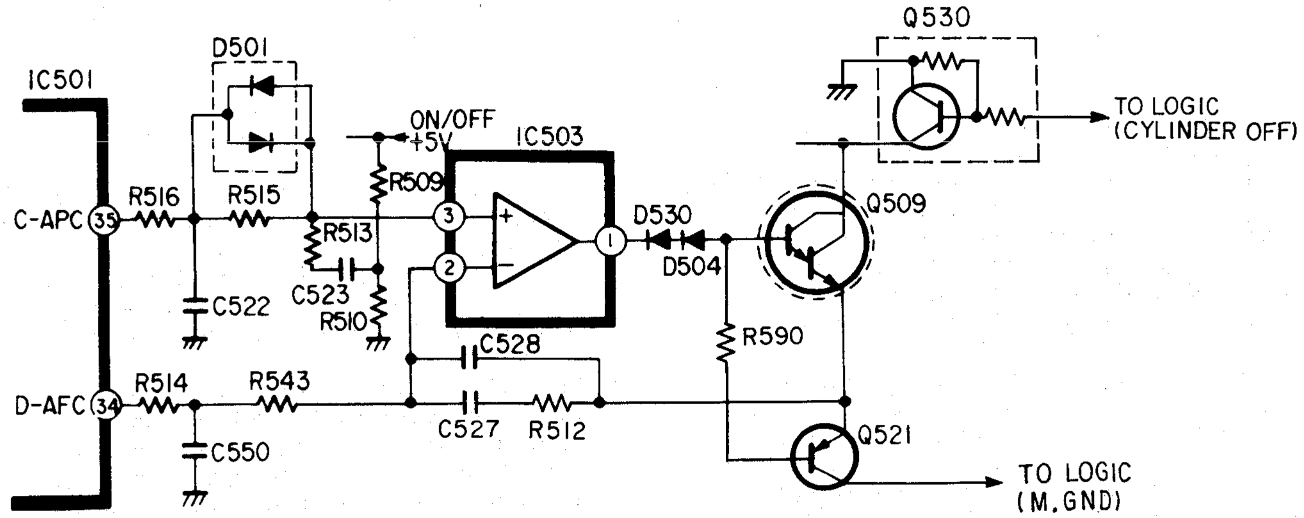


Fig. 2-4

2-4. Capstan servo circuit

1. A purpose of the capstan servo circuit is to control tape speed from 1/3 slow to Cue/Review modes of operations. A direct drive motor is used as a capstan motor.
2. Fig. 2-5 shows a block diagram of the capstan servo circuit and Fig. 2-6 and Fig. 2-7 show timing charts.

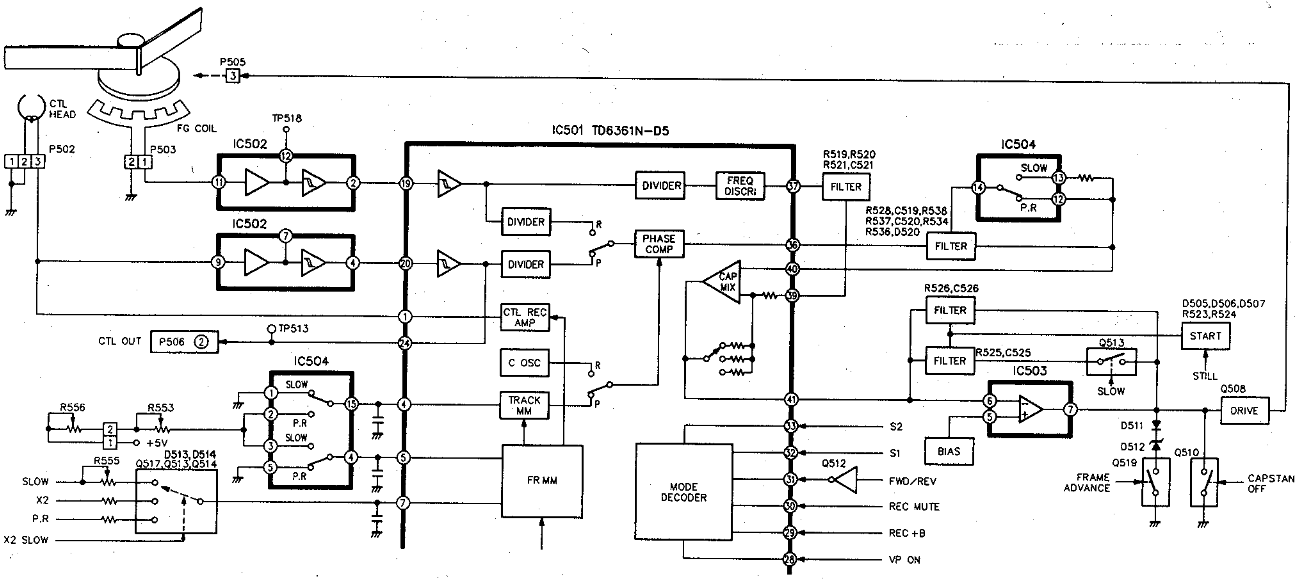

P505
CTL HEAD
FG COIL
P502
P503
TP518
IC502
IC502
IC501 TD6361N-D5
DIVIDER
FREQ DISCRI
DIVIDER
DIVIDER
PHASE COMP
CAP MIX
CTL REC AMP
C OSC
TRACK MM
FR MM
MODE DECODER
R
P
R
P
CTL OUT
P506 ②
TP513
IC504
SLOW
P.R
SLOW
P.R
R556
R553
+5V
R555
D513,D514
Q517,Q513,Q514
SLOW
X2
P.R
X2 SLOW
R519,R520
R521,C521
FILTER
IC504
SLOW
P.R
R528,C519,R538
R537,C520,R534
R536,D520
FILTER
R526,C526
FILTER
FILTER
R525,C525
IC503
Q513
SLOW
D505,D506,D507
R523,R524
START
STILL
Q508
DRIVE
BIAS
S2
S1
Q512
FWD/REV
REC MUTE
REC +B
VP ON
D511
D512
Q519
Q510
FRAME ADVANCE
CAPSTAN OFF

Fig. 2-5 Capstan servo block diagram

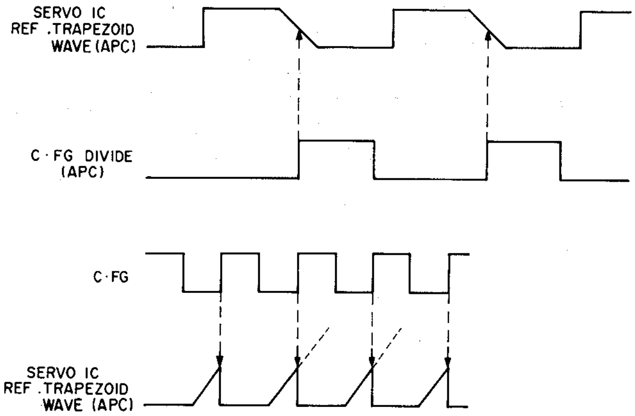


Fig. 2-6 Capstan servo timing chart
(Record mode)

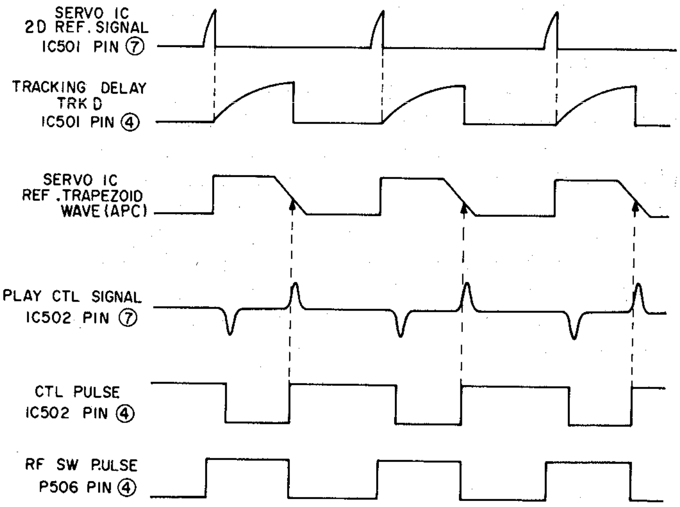


Fig. 2-7 Capstan servo timing chart
(Playback mode)

2-4-1. FG pulse generator, FG amplifier, FG Schmitt circuit

1. The capstan motor is always generating FG pulses as a speed feedback signal for capstan control. FG magnets mounted on outside the motor rotates as the motor rotates and pass away pattern coils on a PC board which is mounted closely to the magnets. In this case the pattern coils develop voltages and the voltages are used as the FG pulses.
2. The FG pulses induced on the coils enter the servo circuit through pin 1 of P503. Number of the FG pulses is 240 pulses per one revolution of the motor or 504 Hz in normal playback and record modes with the servo circuit locked.
3. The FG pulses are amplified, waveshaped by IC502 (FG-CTL AMPIC) and then applied to pin 19 of IC501.

2-4-2. Speed detection (inside IC501)

1. The FG pulses entered pin 19 of IC501 are subject to speed comparison (AFC) in the speed detection circuit, and the resultant output is developed at pin 37 as an approx. 35 KHz PWM (Pulse Width Modulation) square wave signal. The AFC sampling frequency in this case is 504 Hz.
2. Generally speaking, since the capstan system is more subject to external disturbance, the AFC output shows relatively large duty variation if the servo is locked.

2-4-3. Phase detection (Inside IC501)

(1) Record mode

The FG pulses entered pin 19 of IC501 are counted down to 1/20 or 25.2 Hz and compared with a reference signal in time difference (phase detection) in the phase comparator circuit, and the resultant output is obtained at pin 36 as an approx. 35 KHz PWM (Pulse Width Modulation) square wave signal. In this case, the reference signal is 25.2 Hz developed inside the IC for exclusive use of the capstan control system.

(2) Playback mode

In the playback mode, a signal delayed by a time equivalent to a time constant determined by the main tracking resistor R556, subtracking resistor R553, and C518 from falling edge of the reference signal (2D's delayed signal at pin 7 of IC501) used as the reference signal for the cylinder phase detection is used as the reference signal. The reference signal and the CTL signal entered are compared in time difference (phase detection), and outputs as a PWM output at pin 36. Forcing the duty to 50% is also takes place as in the cylinder control for both record and playback operations when the servo is out of lock.

2-4-4. Phase compensation filter, mixing amplifier, and output amplifier circuits

1. The APC output at pin 36 of IC501 passes through a phase compensation filter and a smoothing circuit consisting of R528, C519, R538, R537, C520, R534, and R536, and enters pin 40 of IC501. In the slow mode, R538 and R588 are connected in serially, thereby changing gain of the circuit. The bidirectional diode D502 connected in parallel with R538 functions to speed up charging and discharging C519 to improve response of the circuit.

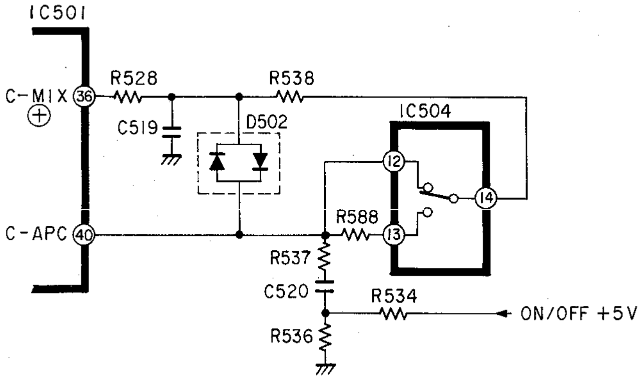


Fig. 2-8

2. The AFC output at pin 37 of IC501 is smoothed by R521, R519, R520, and C521, and then enters pin 39 of IC501. Inside the IC501, the AFC output is differentially amplified and performed APC. Pins 39, 40, 41 of IC501 operates as a loop gain automatic compensated mixing amplifier, and switches the circuit gain depending upon operation mode such as Cue/Review, etc.
3. The mixed and gain compensated signal of the APC and AFC signals develops at pin 41 of IC501 and enters pin 6 of IC503. Next, the signal is compensated by a filter consisting of C525 and R525, and then fed to Q508 drive transistor which drives the capstan motor.
4. D505, D507, and R523 are provided to improve starting characteristic of the motor by giving a fixed bias to C525 when the motor stops. D506 and R524 operate in the slow playback mode. In the slow mode, a filter consisting of R526 and C526 is also added.
5. The start and stop operations of the capstan motor is carried out by Q510 switch. The capstan motor stops when CAP OFF signal, pin 15 of IC601 logic microcomputer develops HIGH. Moreover, forward and reverse control of the capstan motor is performed by CAP F/R signal entered pin 2 of P505 transferred from pin 16 of IC601 logic microcomputer. That is, when the signal is HIGH, the motor rotates in forward and LOW in reverse direction.

2-4-5. Slow tracking

Tracking in the slow mode is carried out by making use of delay time created by 6/4/2 D monomultiplier provided at pin 5 of IC501. IC504 functions as a switch for this operation.

2-4-6. Control (CTL) signal recording

In the record mode, a V-sync signal enters pin 8 of IC501 and a 25 Hz signal is developed from the sync signal. A recording current flows from pin 1 of IC501 into the control head and the current records up to a saturation level on the control track. The recording current is adjusted at approx. 3mAp-p with R542. Duty of the record control pulse is set to approx. 60% inside IC501.

2-4-7. Playback control signal, Schmitt circuit

The playback control signal is amplified and waveshaped by IC502 (FG-CTL amplifier IC) and then enters pin 20 of IC501.

2-4-8. Cue/Review

The Cue/Review operation with fixed noise bars are achieved by rotating the capstan motor at high speed and controlling rotational phase and speed of the motor. When the cue/review (7 times the normal speed) mode is set at pins 28 to 33 of the servo IC, CTL and FG pulses entered the IC are counted down to 1/7 and phase and speed detection processes are carried out. The APC and AFC outputs are obtained at pins 36 and 37, respectively, and applied to the servo loop as in the playback mode, thus driving the capstan motor.

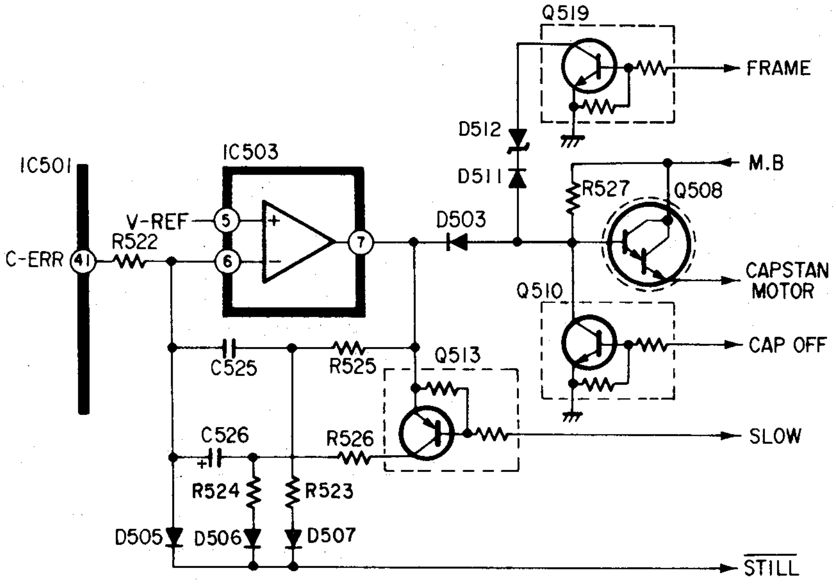


Fig. 2-9

2-4-9. Still, noise feeding (Frame)

1. In the still mode, noise bars are turned from a screen by pulse drive operation. The logic circuit sends still signal (LOW) and D505 connected to an end of feedback capacitor C525 in the capstan system makes pin 6 of IC503 develop Low level. Then pin 7 of IC503, op-amplifier goes HIGH. In the still operation Q510 turns on, and in the frame operation Q519 turns on. As a result, Q508 base shows a voltage determined by D511 and D512. That is, Q510 turns on and off repeatedly, thus driving the capstan motor.
2. The still signal is developed during the mode shift operation, and one end of C525 is also biased by D507 and R523 at about the same value as in the playback mode to perform the mode shift rapidly.

2-4-10. Pseudo V-sync signal circuit

In special playback modes, a pseudo V-sync signal is inserted in a video signal to prevent jitter of pictures. The servo IC, IC501 includes the pseudo V-sync signal generator, and the sync signal outputs from pin 11 of IC501 in the special playback modes except double speed mode, when VP ON signal entered pin 28 of IC501 changes to HIGH or MIDDLE.
In the double speed mode, the pseudo V-sync signal is created in the video circuit.

2-4-11. Synchronous editing

1. In the synchronous editing operation, the capstan motor rotates in reverse direction in a specified amount as soon as the pause mode enters. The servo IC enters the synchronous editing mode as soon as the pause mode is released, and performs phase matching with CTL signal recorded previously, then allows recording again, thereby realizing the synchronous editing without picture disturbance at the connection point.
2. In the synchronous editing, the logic microcomputer counts the FG pulses and controls so that number of the same FG pulses is used in tape rewinding and phase matching operations, thus shortening tape length of overlapping recording.

3. Outline of VPS (V-93G)

1. The VPS is an abbreviation of Video Program System. The VPS is a very useful system to improve time accuracy of timer program reservation. The VPS signal includes a data code (data such as month, day, time, etc.) for identification of each broadcasting program so that users can identify the program with the code. During broadcasting, the VPS signal is always superimposed on 16H-th signal of the video signal and transmitted with a video signal. In other word, a specified program can be identified by decoding (seeing attribution of the code) the VPS code included in the 16H-th signal.
2. Consequently, a new timer reservation system can be designed by introducing the system that identifies the code and a memory system which stores the codes showing programs you want to record to a timer reservation circuit of VTRs. That is, a VPS code in an input video signal is compared with the code memorized in the timer circuit and if they are coincided, the timer recording starts. With this new timer reservation system introduced, no recording failure will occur if time of the reserved program is changed by a certain reason.
3. The VPS signal has a format as shown in Fig. 3-1, and the data line includes required information.

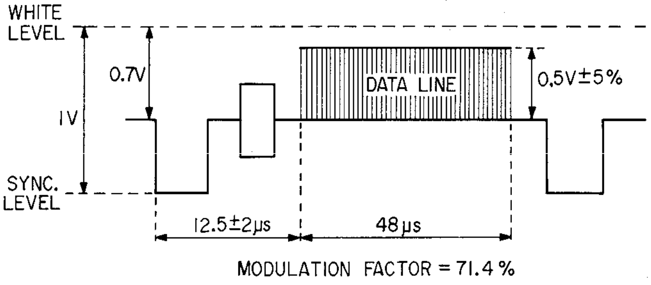


Fig. 3-1 VPS signal format

The data line consists of 15 word data. Of these data 11 through 14th word data are used. One word data consists of 8 bits.

WORD No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15

Fig. 3-2 Details of a data line

In the 11-14th word data, seven information shown below are included:

a. Address range code (2 bits)
b. Transmit date (5 bits)
c. Transmit month (4 bits)
d. Comment start (start of program), hour (5 bits)
e. Comment start (start of program), min. (6 bits)
f. Nationality code (4 bits)
g. Program source code (6 bits)

In total, 32 bits code are used to transmit required information.

For further details, refer to Table 3-1.

(1) Address range code
This shows address range with two bits of "0" and "1".
The address code is an additional code for the program source code.
The program source code consists of 6 bits and this allows identification of programs up to 64, but this may not enough. To cover the lack of information, the address range code is provided to increase amount of information. (With the address range code, upto 4 information can be increased, but only two, 1st address range and 2nd address range, are used at present.)

Table 3-2

	BIT 0	BIT 1
NO.1 ADDRESS RANGE	1	1
NO 2 ADDRESS RANGE	1	0

Table 3-1

DATA WORD NO.	11								12								13								14							
DATA LINE BIT NO.	1							8	1							8	1							8	1							8
VPS LEVEL BIT NO.	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
			M				L	M			L	M				L	M					L	M			L	M					L
REGULAR LEVEL	ADD-RESS RANGE		DAY (BINARY)					MONTH (BINARY)				HOUR (BINARY)					MINUTES (BINARY)						COUNTRY (BINARY)				PROGRAM SOURCE (BINARY)					
SYSTEM STATUS CODE	A	A	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	La	La	La	La	P	P	P	P	P	P
DUMMY CODE	A	A	0	0	0	0	0	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	La	La	La	La	P	P	P	P	P	P
INTERRUPTION CODE	A	A	0	0	0	0	0	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	La	La	La	La	P	P	P	P	P	P

A : real address range code
La : real nationality code
P : real program source code

(2) Coding of issued comment start

Month, day, hour, and minute information for the comment start issued is transferred in 4 blocks (day, month, hour, minute).

- * Maximum day is 31, so 5 bits (allows identification of 32 kinds) are assigned for the code.
- * Maximum month is 12, so 4 bits (allows identification of 16 kinds) are assigned for the code.
- * For the hour codes (0 via 23) 5 bits are assigned (allows identification of 32 kinds).
- * For minute codes (00 via 59) 6 bits are assigned (allows identification of 64 kinds).

(3) Nationality code

Four bits are assigned. That is, countries up to 16 can be identified.

(4) Program source code

The code consists of 6 bits and allows identification of programs up to 64.

3-1. Special system code

As can be seen in Table 3-1, three kinds of codes, system status code, dummy code and interruption code, are provided. These codes are called special system code and used for identification of specified operation status in place of the issued comment start (month, day, hour, and minute).
That is:

1. **System status code:**
   This code is transmitted when a broadcast station can not transmit the normal VPS code in its early stage of the VPS system introduction. In this case, recording will be made in the conventional timer mode.

2. **Dummy code:**
   Code attached on programs not important in recording, such as test pattern, etc.
   In this case, the VTR enters the timer standby mode.

3. **Interruption code:**
   Code transmitted when a program interruption is expected (ex. intermediate election reports) or not expected (ex. news special).
   In this case, the VTR enters REC PAUSE (VPS standby) mode.

The special system code does not exist in the address range code, nationality code, and program source code.

3-2. VPS signal processing in VTR

1. When a VTR is in standby status with programs reserved, the receive circuit always sends video signals to VPS circuit and the VPS circuit is always comparing the code for a program reserved and a code in the VPS signal included in the video signal actually sent, and when both the codes are coincided, a recording status will be set.
   Fig. 3-3 shows a block diagram of the VPS signal processing circuit.

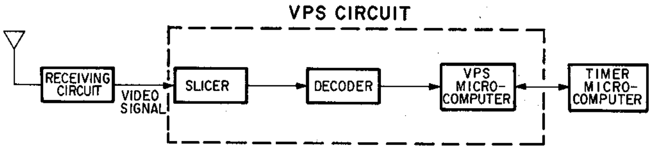


Fig. 3-3 VPS signal processing circuit

2. In the slicer circuit, sync signal and data line signal are extracted from the video signal entered as shown in Fig. 3-4. A data line clock signal is also created in the slicer circuit block. The sync signal and the data line clock signal are used to extract the data line signal existed in 16H-th signal.

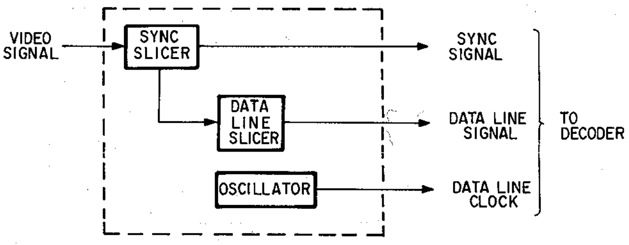


Fig. 3-4 Slicer circuit

3. The decoder circuit decodes the VPS data sent from the slicer circuit so that the microcomputer can read them and then transfers them to the microcomputer.

3-3. VPS circuit (V-93G)

3-3-1. Outline

The VPS circuit consists of three ICs, a slicer IC (SAA5235), decoder IC (SAF1135P), and a microcomputer IC (TMP47C410AN-6696Z).

3-3-2. Dataline slicer

1. A composite signal enters pin 27 of ICX66 (SAA5235, VPS dataline slicer IC) through a capacitor CX73. A capacitor (CX70) connected to pin 26 is used as a memory to store black level.
   The sync slicer operates over a wide range because the sync separation level is set to 50% of the sync signal amplitude and input level of the composite video signal gives little influence. The separated sync signal develops at pin 25 in passing through a buffer.
   The composite signal enters a gain switch after the black level is fixed inside the sync slicer circuit. The gain switch is controlled by pin 2. When the input level of the composite signal at pin 27 is 2.5Vp-p, the switch opens, and when the signal is 1Vp-p the switch is grounded. In the ground switch circuit, the 1Vp-p is selected by grounding.

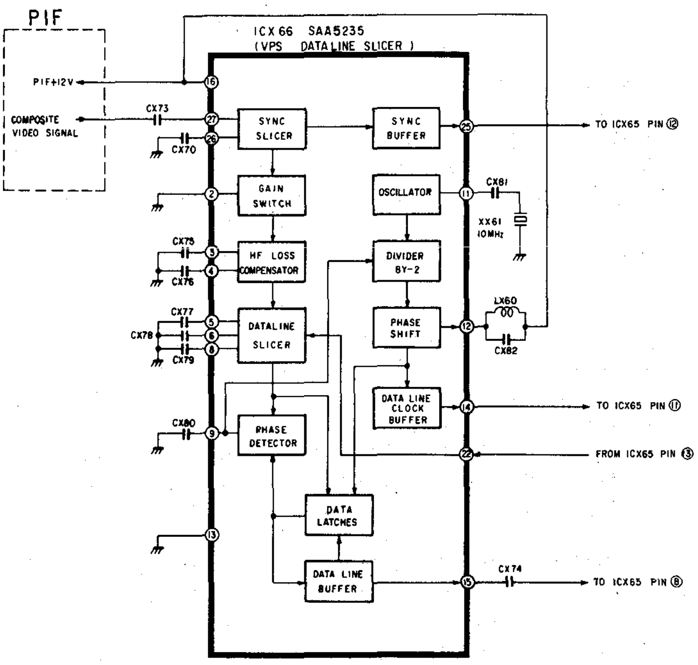

PIF
PIF+12V
COMPOSITE VIDEO SIGNAL
ICX 66 SAA5235
(VPS DATALINE SLICER)
CX73
CX70
CX75
CX76
CX77
CX78
CX79
CX80
⑯
㉗
㉖
②
③
④
⑤
⑥
⑧
⑨
⑬
SYNC SLICER
SYNC BUFFER
GAIN SWITCH
OSCILLATOR
HF LOSS COMPENSATOR
DIVIDER BY-2
DATALINE SLICER
PHASE SHIFT
DATA LINE CLOCK BUFFER
PHASE DETECTOR
DATA LATCHES
DATA LINE BUFFER
㉕
⑪
⑫
⑭
㉒
⑮
CX81
XX61
10MHz
LX60
CX82
CX74
TO ICX65 PIN ⑫
TO ICX65 PIN ⑪
FROM ICX65 PIN ③
TO ICX65 PIN ⑧

Fig. 3-5 VPS dataline slicer block diagram

2. Next, the composite video signal reaches HF loss compensator connected to external circuit through two capacitors (CX75, CX76). The capacitor CX75 connected to pin 3 functions as a filter, and the capacitor CX76 connected to pin 4 stores H.F amplitude information. The signal is then transferred to the dataline slicer. As in the sync slicer, the dataline slicer always separates the data at a value of 50% of the dataline amplitude by using two external memory capacitors (CX77, CX78). The capacitor (CX77) connected to pin 5 keeps the amplitude information and the capacitor (CX78) connected to pin 6 maintains a zero-line information. The capacitor (CX79) connected to pin 8 is charged or discharged through an internal current source of the dataline slicer. This is to perform time limit for data separation with the internal voltage level circuit.
3. To erase old information in the dataline slicer and to reset all clock control circuits, the horizontal frequency data reset signal (DAR), which is supplied from the VPS dataline decoder, SAE1135P (ICX65), must be applied to pin 23.
4. A separated VPS data signal is read in data latches. The clock signal required for the data latch is supplied from pin 11 (10MHz crystal oscillator) through a divider BY-2 and a phase shift circuit. A phase detector compares phases of the VPS data signal and the clock signal. The clock inside the phase shift circuit is shifted until it reaches the best position for data acquisition under control of a low pass filter having a external capacitor (CX80) connected to pin 9. The clock phase can be moved over an interval equivalent to two clock cycles by the phase detector. A data clock filter is necessary between pins 12 and 16 (Vdd) for the phase shifting. The resonant circuit is tuned at a frequency of 5MHz. The data outputs from pin 15 through a dataline data buffer and used as a dataline data signal (DLDA). The clock outputs from pin 14 through a dataline clock buffer and used as a dataline clock (DLCL).

3-3-3. Dataline decoder

1. The dataline decoder ICX65 (SAF1135P) decodes the VPS data separated by the VPS dataline slicer ICX66 (SAA5235) so that the VPS data can be read by the microcomputer connected to the decoder and feeds the data to the microcomputer through I^2C bus-interface.
   In practice, pins 8, 11, 12, and 13 function as the interface for the VPS dataline slicer ICX66 (SAA5235).
2. The VPS dataline decoder ICX65 (SAF1135P) accepts following data from the VPS dataline slicer ICX66 (SAA5235):
   * DLDA (pin 8): Dataline data separated from the composite video signal.
   * DLCL (pin 11): Dataline clock with correct phase relation against reproduced DLDA.
   * VCS (pin 12): Sync signal created by H and V sync signals.

   On the other hand the dataline decoder outputs following signals to the VPS dataline slicer ICX66 (SAA5235)
   * DAR (pin 13): Signal to reset internal registor of ICX66.

The VPS dataline decoder includes following functions:

* Field selection
* Line 16 decoding
* Start code check
* Biphase check
* Storage of data line information
* Generation of data reset pulse
* I^2C bus transmitter

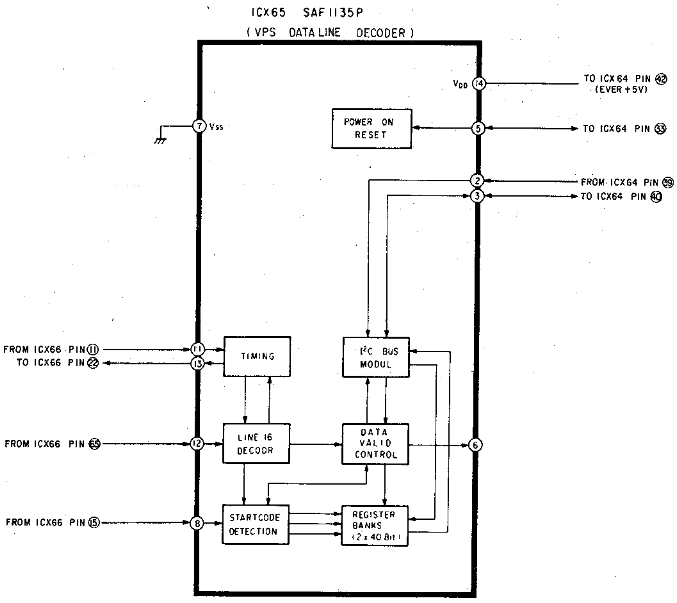


Fig. 3-6 VPS Dataline decoder block diagram

(1) Line 16 decoder

A VPS signal is transmitted at line 16 of a first field of a composite video signal. The field recognition is carried out by testing difference of equalization pulses in the first field and the second field with an internal binary counter. Next, identification of the line 16 is carried out by the counter which operates as a line counter. Thus, the decoder circuit develops a signal showing start time of the line 16.

(2) Start code detector, biphase checker

The dataline data (DLDA) enters a shift register with the dataline clock. Clock synchronization is carried out with a normal bit pattern of "1010...." (WORD1). Next, a start code (WORD2) enters. The start code is used to determine position of each word and bit precisely. (The start code is only one code including patterns not biphase.) When the start code is recognized, data word 5 and 11-14 required for the VPS are decoded. The decoded data are checked whether they are biphase data or not. If they are correct biphase VPS data, they are stored in a data input register of 5 x 8 bits.

(3) Register banks

The data registor consists of input and output registers, each of which has a word length of 40 bits (5 x 8). When all the VPS data enter without any error, a data enable signal (DAV) is generated and a new data flag is set. Then, the data enter the output register with a transfer signal. The VPS detaline decoder SAF1135P has separate input and output registers for the VPS data memory so that the last VPS information entered is not lost.

(4) I^2C bus module

The VPS data (word 5 and 11 to 14) outputs through a serial I^2C bus (pin 3: serial data SDA, pin 2: serial clock SCL). The VPS data entered the output register is read in the microcomputer (ICX64) which functions as a master receiver through a bus. In this case, the VPS dataline decoder SAF1135P functions only a slave transmitter which transfers the data through a bus. That is, the data is not received through the bus. The data transmission is carried out by referring to the I^2C bus specifications.

(5) Data reset signal (DAR)

Pin 13 of SAF1135 (VPS dataline decoder) develops a data reset signal (DAR) every 1H. The data reset signal (DAR) is created from VCS, and has LOW time period of TL = 7.8µs. The signal enters the dataline slicer SAA5235 (ICX66) and functions as the reset signal.

3-3-4. VPS microcomputer

The VPS microcomputer (ICX64) requests the data to the dataline decoder (ICX65) every 81ms.

(1) VPS data detection

1. Each output register bit of the VPS dataline decoder SAF1135P (ICX65) is designed to be filled by "1" if the decoder receives abnormal VPS data due to weak receive conditions such as poor field strength, etc. (Same as in reception of a broadcasting program without VPS label.)
   When the VPS microcomputer (ICX64) reads the data consisting of all bits filled by "1", the VPS microcomputer understands the signal is a broadcasting without VPS signal and allows the recording from the start time to the end time which have been reserved.
2. However, when the computer reads the data consisting of all bits filled by "1" in continuation of approx. 10 sec as a normal label exists under the poor conditions, the signal received is determined as "a broadcasting without VPS signal". However, when a channel is changed, it is determined by approx. 1.3sec.
3. A normal VPS data is assumed as correct if data coincidence occurs three times. That is, when a normal data enters before a data of all 1's enters 16 times repeatedly, the normal data is counted as one time. When such condition occurs three times, the computer understands data coincidence of three times is obtained and the VPS data is effective. If a different data is received before three time coincidence occurs, the counting operation is restarted at that time.

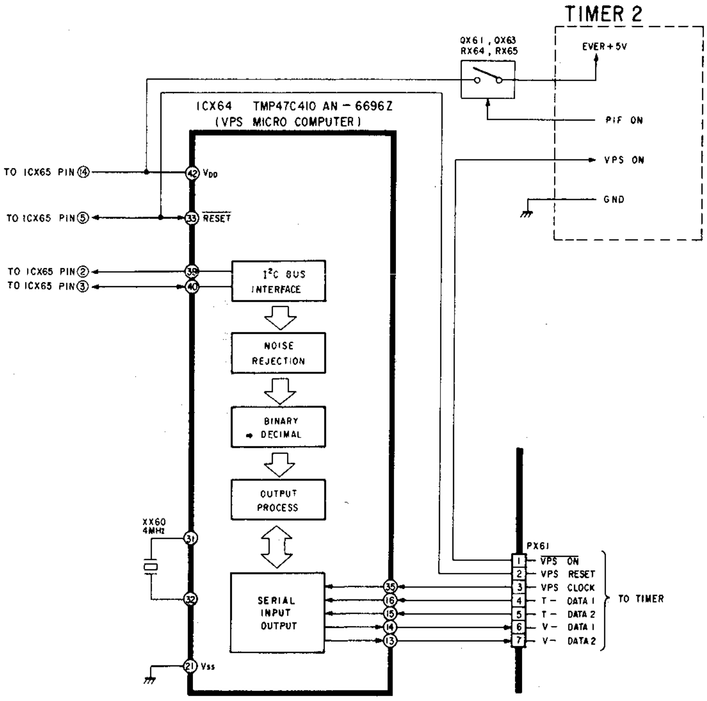

TIMER 2
QX61, QX63
RX64, RX65
EVER+5V
PIF ON
VPS ON
GND
ICX64 TMP47C410 AN-6696Z
(VPS MICRO COMPUTER)
TO ICX65 PIN ④
TO ICX65 PIN ⑤
TO ICX65 PIN ②
TO ICX65 PIN ③
42 V_DD
33 RESET
39
40
I²C BUS INTERFACE
NOISE REJECTION
BINARY → DECIMAL
OUTPUT PROCESS
SERIAL INPUT OUTPUT
XX60 4MHz
31
32
21 Vss
35
16
15
14
13
PX61
1 VPS ON
2 VPS RESET
3 VPS CLOCK
4 T- DATA 1
5 T- DATA 2
6 V- DATA 1
7 V- DATA 2
TO TIMER

Fig. 3-7 VPS microcomputer block diagram

(2) VPS data processing:

Of the effective VPS data (binary) developed in this way, contents of digits for 10 hours, 1 hour, 10 minutes, and 1 minute are converted into BCD codes. The converted data are compared with reserved start time data to know they are coincided or not, thus testing the data.

(3) Data transmission

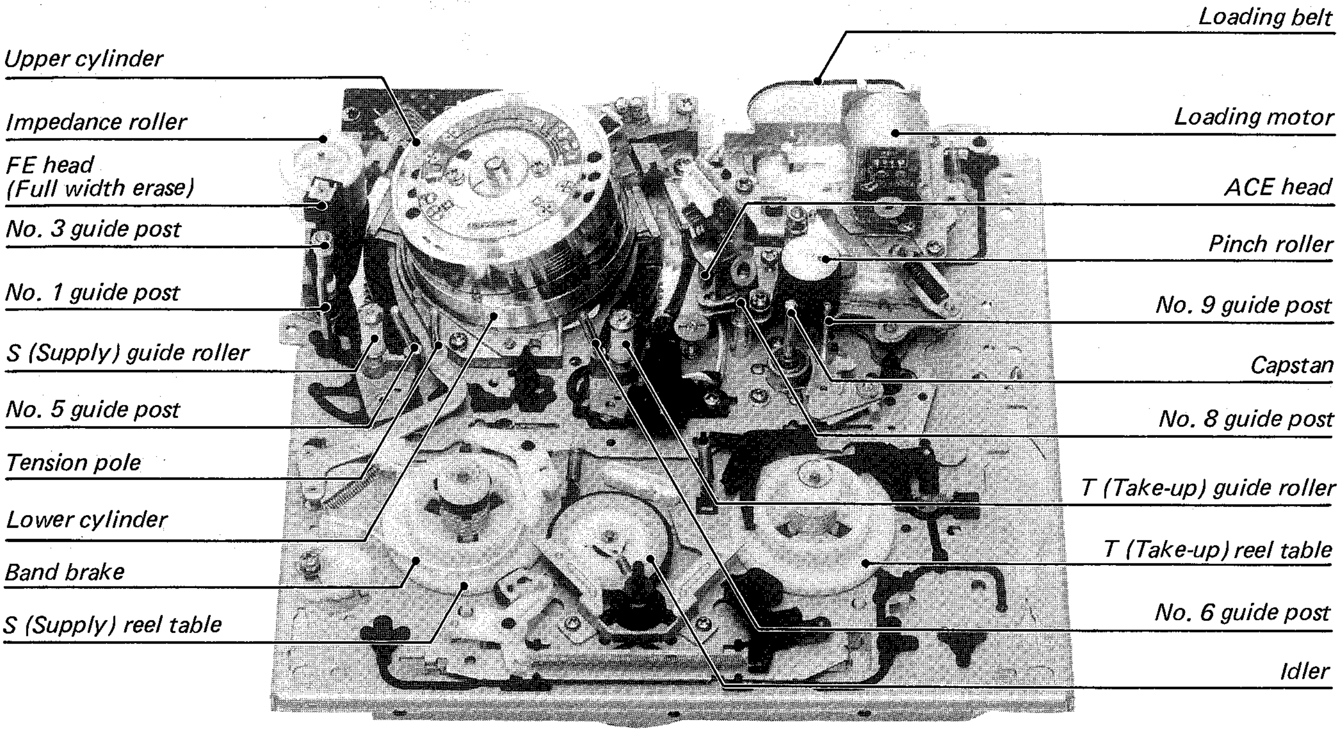
1. The data processed by the VPS microcomputer (ICX64) are transferred to the timer microcomputer (ICX01). 5 pins are used for this transfer to the timer microcomputer. Pin 35 accepts a clock signal for the transmission. Pins 15 and 16 are used as data input terminals. Pins 13 and 14 are used as data output terminals. The transfer starts reception of 24 bit data from the timer microcomputer (ICX01). Next, the VPS microcomputer (ICX64) transfers 24 bit data, thus completing one cycle of the transferring operation.
2. The data received from the timer microcomputer are reservation start time data for comparison with the VPS data stated previously and a VPS data request signal, etc. On the other hand, the transmitting data are the reservation start time data received, and the comparison result data of the reservation start time data and the VPS data, etc. Normally, the VPS microcomputer (ICX64) directly returns the reservation start time data received from the timer microcomputer (ICS01). However, when the timer microcomputer (ICX01) transfers VPS data returning requests, the VPS microcomputer transfers the VPS data instead of the reservation start time data. The timer microcomputer (ICX01) receives these data from the VPS microcomputer (ICX64) and sends commands for VPS REC or VPS OTR operations.

SECTION 2
ADJUSTMENT PROCEDURES

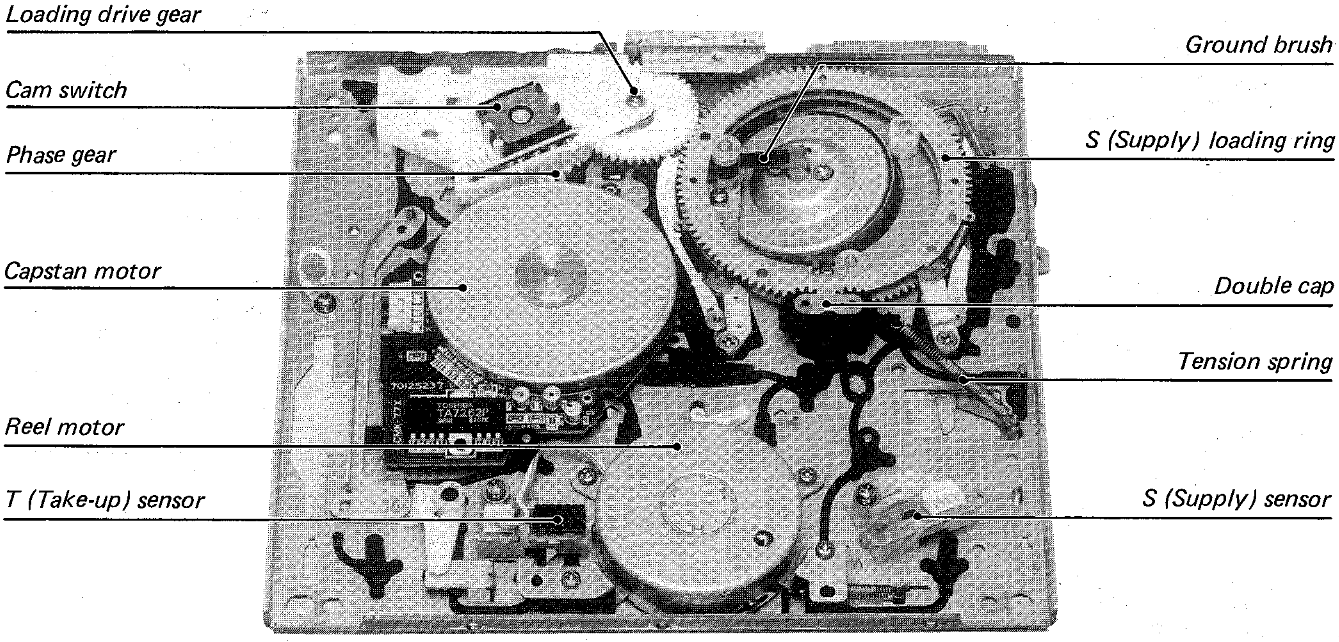
1. MECHANICAL ADJUSTMENT

1-1. Mechanical Parts Location

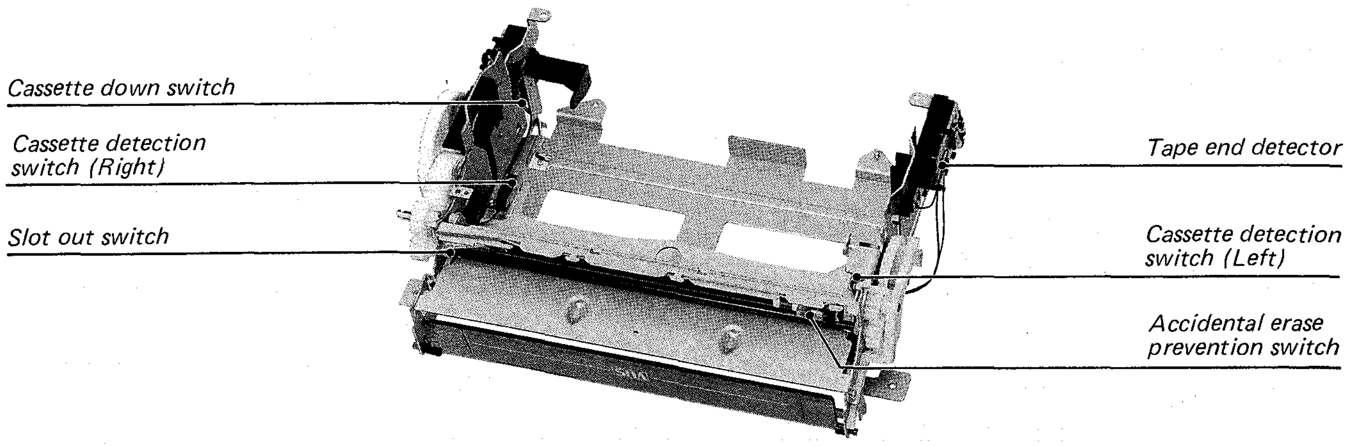
1-1-1. Top View

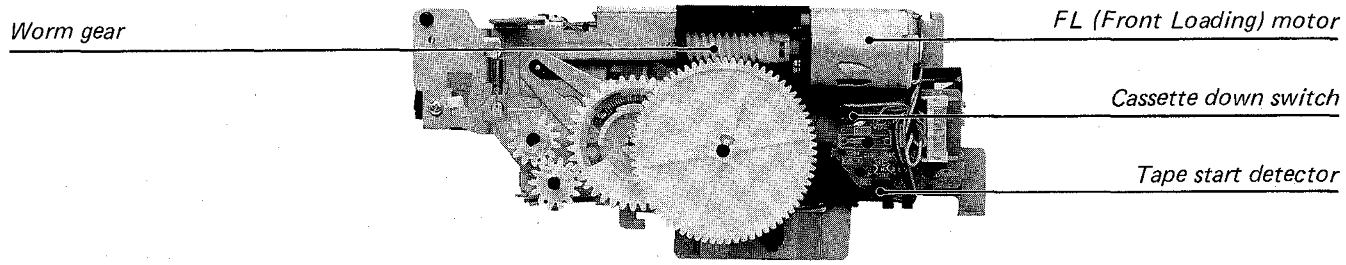

Upper cylinder
Impedance roller
FE head (Full width erase)
No. 3 guide post
No. 1 guide post
S (Supply) guide roller
No. 5 guide post
Tension pole
Lower cylinder
Band brake
S (Supply) reel table
Loading belt
Loading motor
ACE head
Pinch roller
No. 9 guide post
Capstan
No. 8 guide post
T (Take-up) guide roller
T (Take-up) reel table
No. 6 guide post
Idler

1-1-2. Bottom View

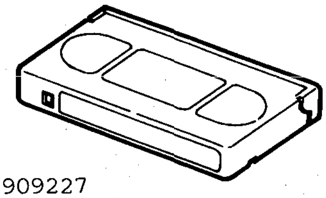
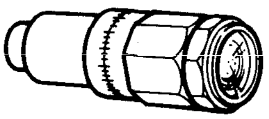
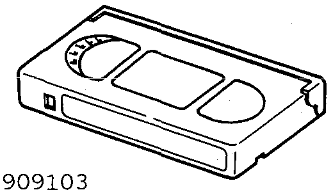
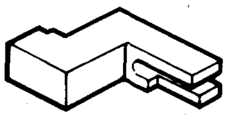
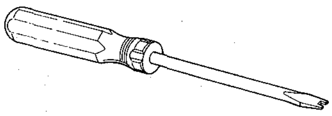
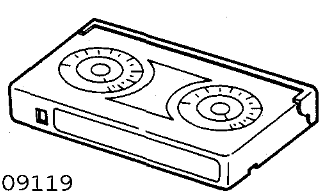
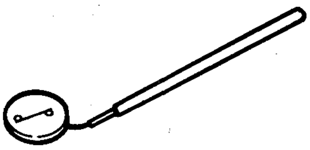
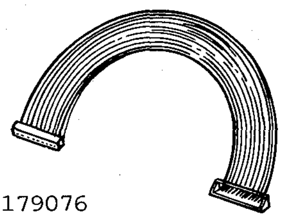

Loading drive gear
Cam switch
Phase gear
Capstan motor
Reel motor
T (Take-up) sensor
Ground brush
S (Supply) loading ring
Double cap
Tension spring
S (Supply) sensor

1-1-3. Front Loading Mechanism


Cassette down switch
Cassette detection switch (Right)
Slot out switch
Tape end detector
Cassette detection switch (Left)
Accidental erase prevention switch


Worm gear
FL (Front Loading) motor
Cassette down switch
Tape start detector

1-2. Servicing Jig List

Alignment tape (ST-C1)  70909227	Torque gauge  70909098	Back tension cassette gauge  70909103
Height gauge  70909113	Taper nut driver  70909228	Torque cassette gauge (KT-300NR)  70909119
Dental mirror  70954003	Patch cord  70179076	MH-2 (70909094) can be used instead of alignment tape ST-C1.

1-3. Main Parts Replacement

1-3-1. Front Loading

(1) Front loading assembly

<Replacement>

1. Disconnect the relay cable connector from the Relay P.C. board.
2. Loosen 2 mounting screws on the deck top shield plate, and remove the shield plate.
3. Remove 2 screws securing the front loading assembly on the base.
4. First, pull the front loading assembly forward, unhook claws from the holes on the main base, and then take out the loading assembly upward, and replace it.

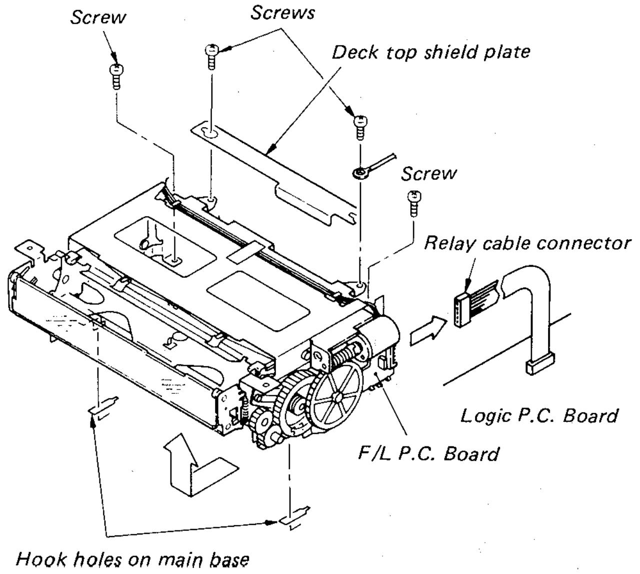


Fig. 1-3-1 Front loading assembly replacement

(2) Door

<Replacement>

1. Make sure the cassette holder is in the cassette eject position.
2. Turn the cassette door until the left door shaft matches its receptacle of the door bracket, and then slide the door rightward.
3. Warp the door forward at its center and disengage the left side of the door from the door bracket. Move the door left side to remove it.
4. Remove a door spring from the right door shaft and replace it. Apply slight amount of grease on both shafts of the door to replace.

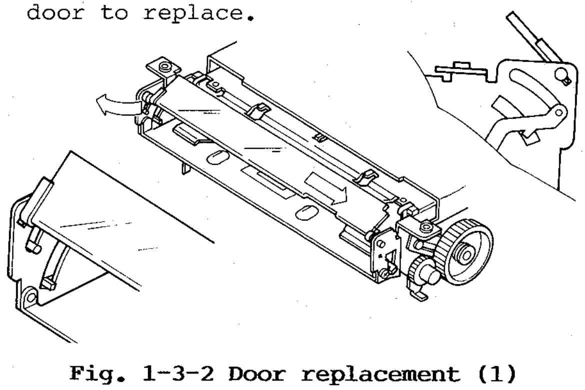


Fig. 1-3-2 Door replacement (1)

5. Insert the door spring into the right door shaft of the new door.
6. Insert the tip of door spring into the spring hook (hole) on the guide bracket, and insert the right door shaft into the guide bracket.

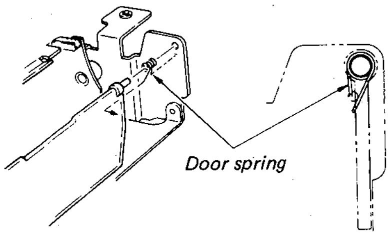


Fig. 1-3-3 Door replacement (2)

7. Insert the left door shaft into the guide bracket while warping the door slightly forward. In this case, make sure that the door lever pin is positioned as shown in Fig. 1-3-4.

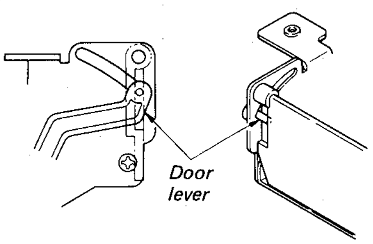


Fig. 1-3-4 Door replacement (3)

(3) Cassette detection switches, L, R

<Replacement>

1. Remove the front loading assembly from the chassis.
2. Place the front loading assembly upside down.
3. Unsolder leads from the switch terminals using a soldering iron. In this case, the unsoldering work will be made easily if the cassette holder is moved down by rotating the coupling section of the worm gear and the motor. (Do not touch your hand to gear teeth.)
4. Remove screws securing the switches and replace the switches.
5. When mounting new switches, perform the above previous steps in reverse order.

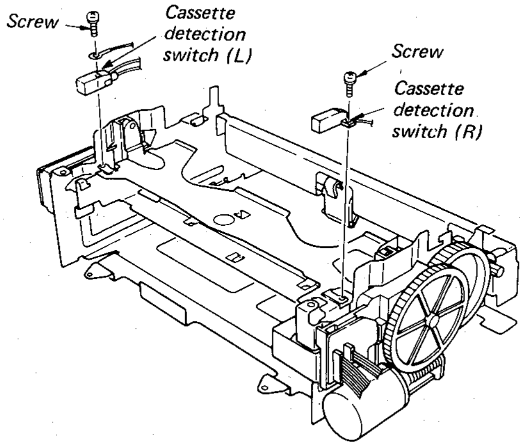


Fig. 1-3-5 Replacement of cassette detector

(4) Cassette down switch
<Replacement>

1. Remove the front loading assembly from the chassis.
2. Remove the FL P.C. board (R) unhooking the mold claws on the guide R.
3. Remove the screw securing the switch and take out the switch.
4. Unsolder the leads from the switch terminals using a soldering iron.
5. When remounting a new switch, perform the previous steps in reverse order.

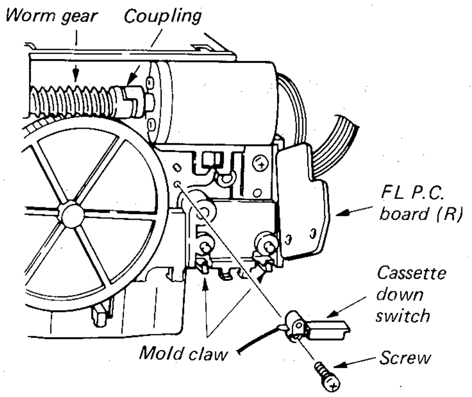

Worm gear
Coupling
FL P.C. board (R)
Cassette down switch
Mold claw
Screw

Fig. 1-3-6 Cassette down switch replacement

(5) Slot out switch and accidental erase prevention switch

1. Remove the front loading assembly from the chassis.
2. Place the loading assembly with the door facing upward.
3. Unsolder the leads from the switch terminals, using the soldering iron.
4. Remove the screw securing the switch.
5. When mounting the switch, perform the previous steps in reverse order.

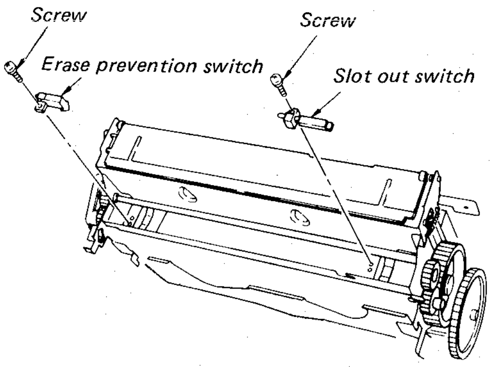

Screw
Erase prevention switch
Screw
Slot out switch

Fig. 1-3-7 Replacement of slot out switch and erase prevention switch

(6) FL motor assembly
<Replacement>

1. Remove the front loading assembly from the chassis.
2. Unsolder the leads from the motor terminals, using the soldering iron.
3. Remove the screws securing the FL motor assembly on the guide R and remove the assembly.
4. When mounting the assembly, perform the previous steps in reverse order.

Note:
When replacing the FL motor, always use a motor with a label in green letters. Do not use any other motor.

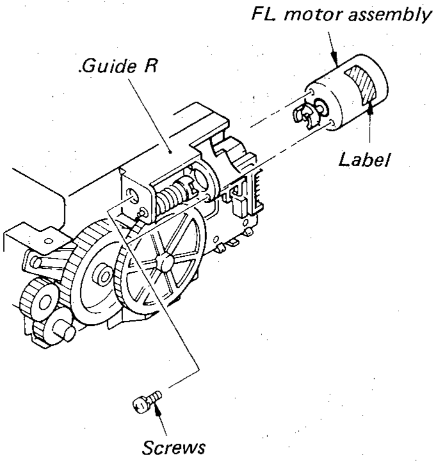

FL motor assembly
Guide R
Label
Screws

Fig. 1-3-8 Replacement of motor assembly

(7) Photo transistor
<Replacement>

1. Remove the front loading assembly from the chassis.
2. Remove the FL P.C. board (R) unhooking the mold claws on the guide R.
3. Unsolder the photo transistor from the FL P.C. board, using the soldering iron.

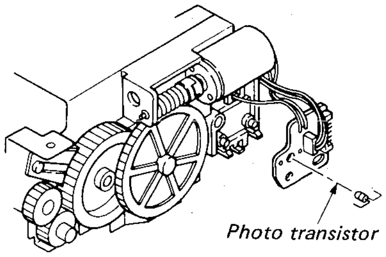


Photo transistor

Fig. 1-3-9 Replacement photo transistor on FL P.C. board (R)

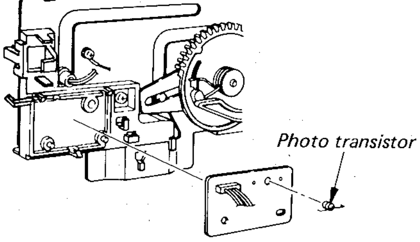


Photo transistor

Fig. 1-3-10 Replacement of photo transistor on FL P.C. board (L)

4. Bend leads of a new photo transistor as shown in Fig. 1-3-11.
5. When remounting the transistor, perform the previous steps in reverse order.
6. The replacement method will apply to both the photo transistors on the left and right FL P.C. boards.

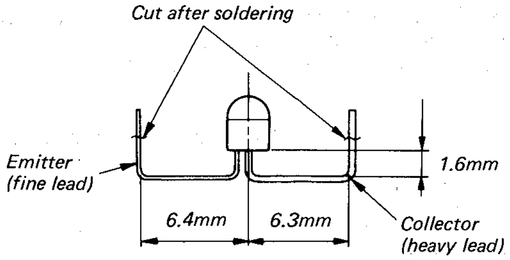

Cut after soldering
Emitter
(fine lead)
1.6mm
6.4mm
6.3mm
Collector
(heavy lead)

Fig. 1-3-11 Forming of photo transistor leads

1-3-2. Cylinder

(1) Upper cylinder assembly

<Inspection>

1. Check if video heads are damaged or worn out.
2. Check video heads for clogging.
   (Replace the upper cylinder assembly if the clogging is not remedied after cleaning.)

<Replacement>

1. Unsolder the relay terminals (at the marks Δ, 2 pairs - in total 2 locations) on the head relay P.C. board. The solder will be removed easily using a desoldering wire (Fig. 1-3-12/1-3-13).
2. Remove two screws (A) and remove the upper cylinder assembly.
3. Clean the new upper cylinder assembly and the surface of the flange before mounting, using a cleaning kit.
4. Align phases of the white part of Head relay P.C. board and Rotary transformer (A) P.C. board and then mount the upper cylinder.
   (Tightening torque; 3 - 4kg-cm.)
5. Perform the tape transport adjustment.

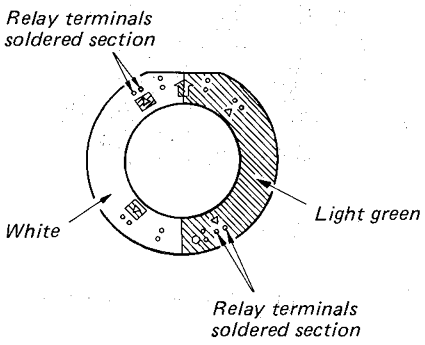

Relay terminals
soldered section
White
Light green
Relay terminals
soldered section

Fig. 1-3-12 Head relay P.C. board

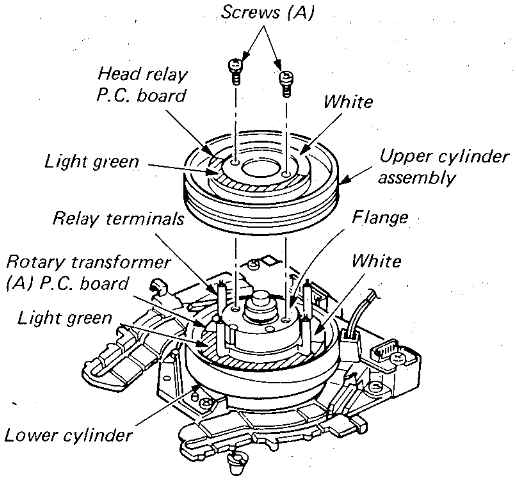

Screws (A)
Head relay
P.C. board
White
Light green
Upper cylinder
assembly
Relay terminals
Flange
Rotary transformer
(A) P.C. board
White
Light green
Lower cylinder

Fig. 1-3-13 Upper cylinder replacement

(2) Cylinder motor

<Inspection>

1. Apply power to the cylinder motor separately.
2. If the motor does not rotate, replace the rotor or the stator.

<Rotor replacement>

1. Remove the ground cap.
2. Remove two rotor screws and replace the rotor.
   (Tightening torque; 3 - 4kg-cm.)

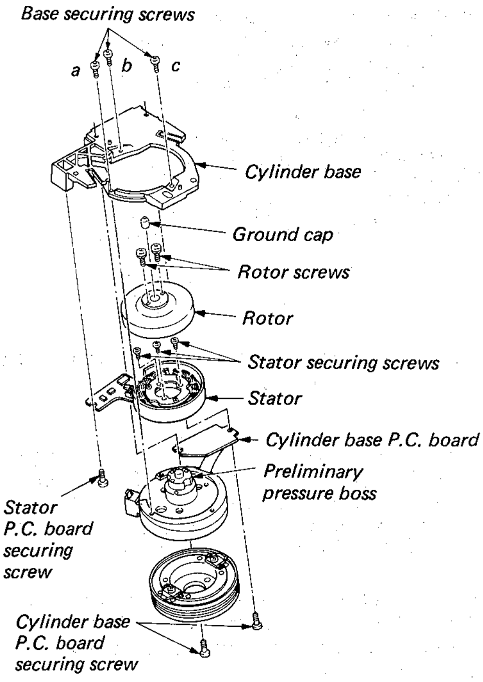

Base securing screws
a
b
c
Cylinder base
Ground cap
Rotor screws
Rotor
Stator securing screws
Stator
Cylinder base P.C. board
Preliminary
pressure boss
Stator
P.C. board
securing
screw
Cylinder base
P.C. board
securing screw

Fig. 1-3-14 Cylinder motor replacement

Note:
Mount a new rotor, matching the phase decision holes of rotor and preliminary pressure boss. (Fig. 1-3-14, 15)

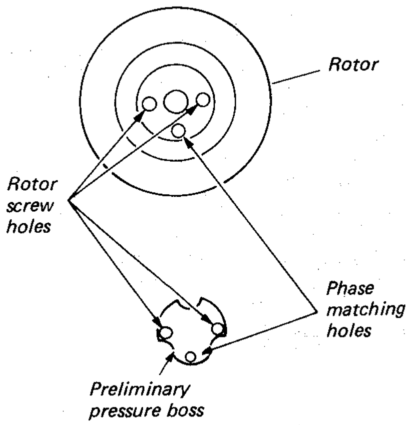

Rotor
Rotor screw holes
Phase matching holes
Preliminary pressure boss

Fig. 1-3-15 Phase matching between rotor and preliminary pressure boss

<Stator replacement>

1. Remove the cylinder assembly. (Refer to 1-3-2(3))
2. Remove two cylinder base P.C. board securing screws and stator P.C. board securing screw (Fig. 1-3-16).

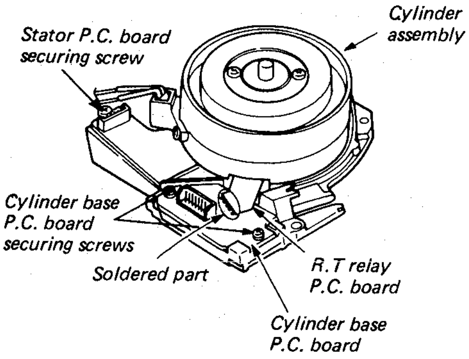

Stator P.C. board securing screw
Cylinder assembly
Cylinder base P.C. board securing screws
Soldered part
R.T relay P.C. board
Cylinder base P.C. board

Fig. 1-3-16 Relay P.C. board and cylinder base P.C. board

Note:
In this case, take care not to damage patterns of the R.T relay P.C. board. Also handle the cylinder base P.C. board carefully so that the cylinder is not damaged with the P.C. board.

3. Remove three base securing screws and remove the cylinder base.(Fig. 1-3-14)
4. Remove the rotor screws and the rotor. (Fig. 1-3-14)

Note:
Follow the procedures under "<Rotor replacement>".

5. Remove the stator securing screws.
6. Pull out the stator and replace it. (Tightening torque 1.5 - 2.5 kg-cm)
7. When mounting the cylinder assembly, perform the previous steps in reverse order.

Note:
Sequence of tightening base securing screws: tighten screw a first, b and c in any order. (Tightening torque is 3 - 4 kg-cm.) (Fig. 1-3-14)

8. Perform the tape transport adjustment.

(3) Cylinder assembly

<Inspection>

1. Check to see that rotating surface of the lower cylinder has no damage such as scratches, cracks, etc.
2. Check to see smooth rotation of the upper cylinder.
   If abnormality is found, replace the cylinder(s).

<Replacement>

1. Remove the Pre Amp P.C. board, 5P connector (cylinder motor), and the dew heater.
2. Remove three screws (A).
3. Remove the cylinder assembly.

Note:
In this case, move the impedance roller in direction shown by the arrow.

4. Align position of a new cylinder to the cylinder base, taking care not to touch the video heads directly and not to damage the cylinder surface.
   When mounting the cylinder assembly, perform the previous steps in reverse order.
5. Perform the tape transport adjustment.

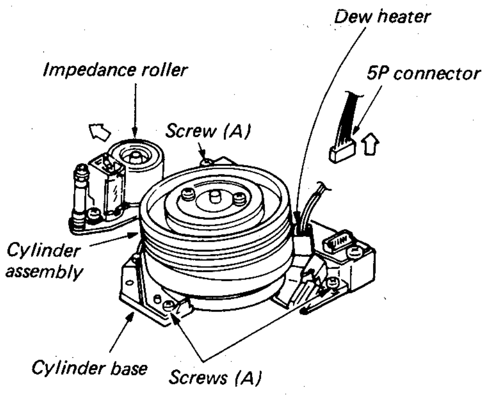

Dew heater
Impedance roller
5P connector
Screw (A)
Cylinder assembly
Cylinder base
Screws (A)

Fig. 1-3-17 Cylinder assembly replacement

1-3-3. Transport System Parts Replacement

(1) ACE head assembly replacement

1. Disconnect a 6P connector from the ACE P.C. board.
2. Turn the ACE height adjusting nut counterclockwise and remove the nut in order to remove ACE base assembly. (Fig. 1-3-18)

Note:
Note positions of the ACE base and the taper nut.

3. Remove the E-ring and the ACE azimuth adjusting screws in order to remove the ACE head assembly.
4. Remove the ACE P.C. board from the ACE head assembly.
5. Replace the ACE head assembly, according to the reverse procedures.
6. Rotate the ACE height adjustment nut until the ACE base and the upper position of the taper nut have the same position as noted in step 2.
7. After mounting, perform the tape transport adjustment, starting from the first step.

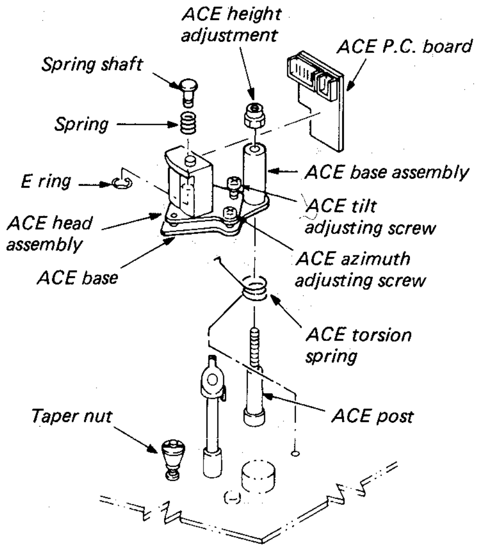

ACE height adjustment
ACE P.C. board
Spring shaft
Spring
E ring
ACE base assembly
ACE tilt adjusting screw
ACE head assembly
ACE base
ACE azimuth adjusting screw
ACE torsion spring
Taper nut
ACE post

Fig. 1-3-18 Replacement of ACE head assembly

Note:
When replacing the ACE head assembly, always use an ACE head with a green label. Do not use any other ACE head assembly.

(2) Guide sleeve replacement

<No. 3 guide sleeve replacement>

1. Rotate the No. 3 guide nut counterclockwise and remove the No. 3 guide nut and flange as shown in Fig. 1-3-21. When replacing a new flange, perform the previous steps in reverse order.
2. After the replacement, preset height of the lower flange as shown in Fig. 1-3-19, using the guide height gauge.
3. After completion of preset, perform adjustments by following the procedures for Linearity Adjustment, item 3) of the Tape Transport Adjustment. (Refer to 1-4-4 (2).)

Note:
The flange arranged in upper and lower positions are common parts and can be used in either place and upside down.
(Fig. 1-3-21)

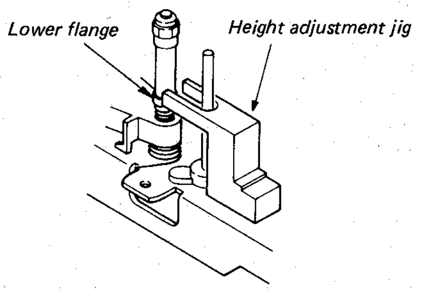

Lower flange
Height adjustment jig

Fig. 1-3-19 No. 3 guide preset

<No. 8 guide sleeve replacement>

1. Remove No. 8 cap through the No. 8 lower flange in this sequence as shown in Fig. 1-3-20. When reassembling, perform the previous steps in reverse order.

Note:
When mounting the No. 8 guide cap, mount it with its slant surface facing to the cassette side.

2. After completion of this replacement, perform adjustments by following the procedures for the linearity adjustment, item 3) of the transport adjustment. (Refer to 1-4-4 (2))

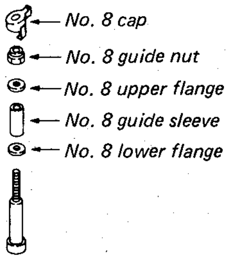

No. 8 cap
No. 8 guide nut
No. 8 upper flange
No. 8 guide sleeve
No. 8 lower flange

Fig. 1-3-20 No. 8 guide replacement

(3) FE head replacement

1. Disconnect the 2P connector of the FE head.
2. Remove the FE head mounting screw and the FE head can be removed. (Fig. 1-3-21)
3. Replace the new FE head and tighten the FE head mounting screw.
4. Connect 2P connector.
5. The replacement of the FE head causes little change in linearity. But confirm whether the associated adjustments have not been upset, starting check from the linearity adjustment, item 3) of the tape transport adjustment. (Refer to 1-4-4 (2).)

(4) Impedance roller replacement

1. Remove the washer and replace the impedance roller as shown in Fig. 1-3-21.

Note:
The polyslider must be inserted between the impedance roller and the entrance lever, take care not to miss it. An impedance roller with scratches may damage the tape, so handle it carefully.
If your fingers touch the surface of the impedance roller, clean the surface with alcohol.

2. After replacement of the impedance roller, perform the adjustment from the linearity adjustment, item 3) in the tape transport adjustment. (Refer to 1-4-4 (2).)

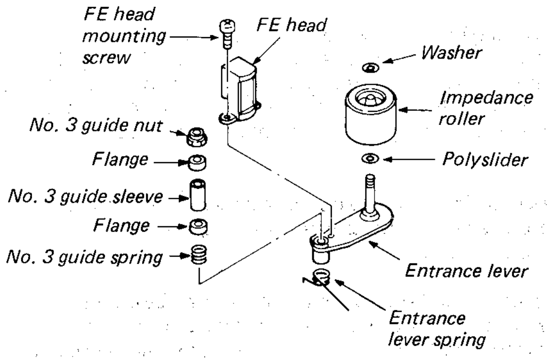


Fig. 1-3-21 Replacement of No. 3 guide and FE head

(5) S, T-guide rollers replacement

The same replacement procedures will be applied for both S and T-guide rollers.

1. Loosen the set screw shown in Fig. 1-3-22.
2. Turn the guide roller counterclockwise and remove it.
3. As the O-ring may stick to the guide roller when removed, remove the O-ring and install it on the new guide roller.
4. When remounting, perform the previous steps in reverse order.

Note:
When tightening the set screw, temporarily tighten it with light pressure. If it is tightened too hard, associated adjustments can not be made.
The T-guide roller has a black mark on upper flange. Do not exchange them when remounting.

5. After completion of the replacement, perform adjustment from the linearity adjustment item 3) in the tape transport adjustment. (Refer to 1-4-4 (2).)

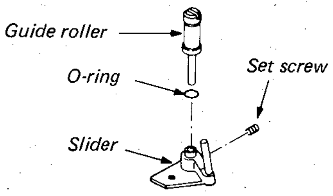


Fig. 1-3-22 Guide roller replacement

(6) S, T-sliders replacement

1. Remove the cylinder assembly.
2. Place the VCR vertically and remove the bottom cover.
3. Remove the connecting screw shown in Fig. 1-3-23.

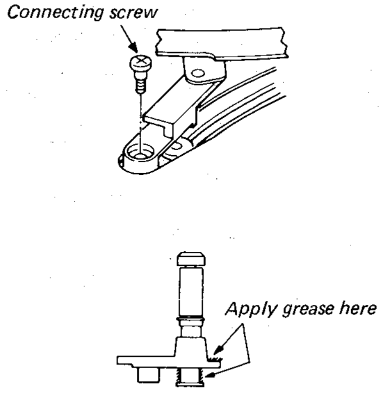


Fig. 1-3-23 S, T-slider replacement

4. Move the slider up to the loading position turning loading motor with your hand, and the slider can be removed.
5. Remove the guide roller and reinstall it in a new slider according to the steps stated in (5).
6. When replacing the slider, perform the previous steps in reverse order.
7. After completion of the replacement, perform adjustment from tape transport system adjustment. (Refer to 1-4-4 (2)).

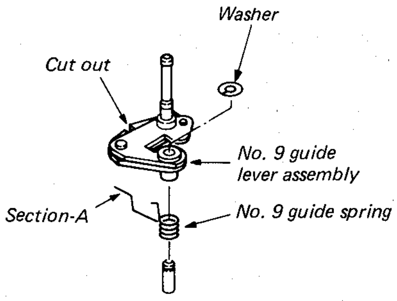
Note:
When the slider is replaced, always apply grease to the slider as shown in Fig. 1-3-23.

(7) No. 9 guide lever assembly replacement

1. Remove the washer shown in Fig. 1-3-24.
2. Remove No. 9 guide lever assembly shown in Fig. 1-3-24.
3. When replacing, perform the previous step in reverse order.

Note:
When mounting the No. 9 guide lever assembly, temporarily hook section A of No. 9 guide spring at the cutout on No. 9 guide lever and then insert the guide lever assembly into the pin. Then unhook the section A from the cutout.

4. After completion of the replacement, perform adjustment from the item 5) in the tape transport adjustment. (Refer to 1-4-4 (2)).

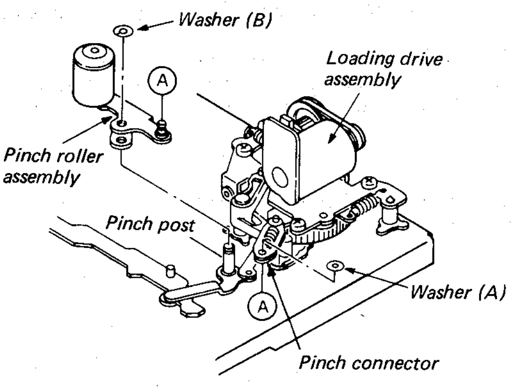


Washer
Cut out
No. 9 guide lever assembly
Section-A
No. 9 guide spring

Fig. 1-3-24 No. 9 guide lever replacement

1-3-4. Pinch Roller Assembly Replacement

1. Remove the washer (A) and disconnect the pinch connector from the pinch roller assembly.
2. Remove the washer (B) and remove the pinch roller assembly upward.
3. Clean the pinch post and apply grease on it.
4. Replace the pinch roller assembly according to the previous steps in reverse order.
5. After completion of the replacement, perform adjustment from item "1-4-4 (2) Tape transport system adjustment".

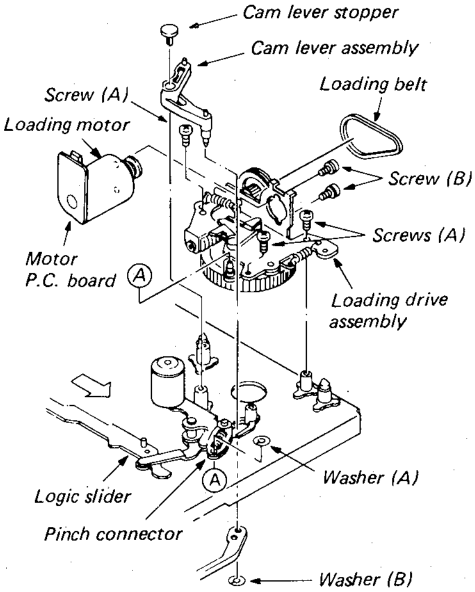


Washer (B)
Ⓐ
Loading drive assembly
Pinch roller assembly
Pinch post
Washer (A)
Ⓐ
Pinch connector

Fig. 1-3-25 Pinch roller replacement

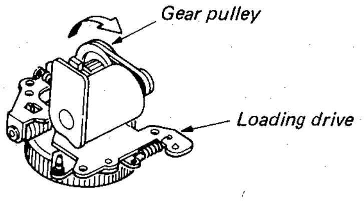
1-3-5. Loading Motor Replacement

1. Remove the motor P.C. board from the motor, taking care not to damage wire leads.
2. Remove the washer (A) and disconnect the pinch connector.
3. Remove the cam lever stopper and the washer (B), and remove the cam lever assembly upward.
4. Turn the gear pulley in direction shown by the arrow until it stops to set the FF/REW mode. (Fig. 1-3-27)
5. Remove the screws (A) and remove the loading drive assembly.
6. Remove the loading belt and the screws (B), and remove the motor.
7. Replace the motor. When replacing with a new motor, perform the previous steps in reverse order, taking care of polarities (+ polarity should be located on upside).
8. When mounting the loading drive assembly on the main base, first push the logic slider rightward (shown by the arrow) until it stops, and then mount the drive assembly.
9. Confirm timing of the phase gear, referring to the item 1-4-1.



Cam lever stopper
Cam lever assembly
Screw (A)
Loading belt
Loading motor
Screw (B)
Screws (A)
Motor P.C. board Ⓐ
Loading drive assembly
Washer (A)
Logic slider
Ⓐ
Pinch connector
Washer (B)

Fig. 1-3-26 Loading motor replacement



Gear pulley
Loading drive

Fig. 1-3-27 Loading drive . FF mode

Note:
When replacing the loading motor always use a loading motor with a label in green letters. Do not use any other motor.

1-3-6. Band Brake Assembly Replacement

1. Remove the S-soft brake assembly.
2. Remove a tension spring from a tension lever.
3. Remove the screw and remove the tension lever and the band brake assembly from the main base.
4. Remove the band brake assembly from the tension lever and replace the band brake assembly.
5. Clean the shaft of the tension lever and then apply one or two drops of oil. When replacing with a new band brake assembly, perform the previous steps in reverse order.
6. After completion of the replacement, check position of the tension pole and its adjustment (refer to item 1-4-2) and check the back tension (refer to item 1-4-3).

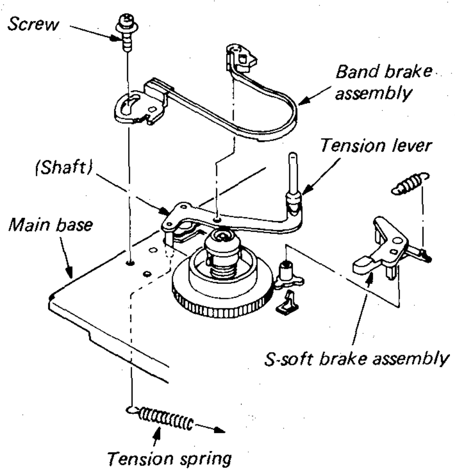

Screw
Band brake assembly
Tension lever
(Shaft)
Main base
S-soft brake assembly
Tension spring

Fig. 1-3-28 Band brake assembly replacement

1-3-7. Cam Switch Replacement

1. Remove the screw and the cam switch bracket.
2. To remove the cam switch, move it upward with a screwdriver while opening the claw of the cam switch bracket.
3. Perform the phase matching adjustment (timing check), referring to the item 1-4-1.
4. Replace the cam switch and mount it on the cam switch bracket.
5. When mounting the cam switch on the phase gear shaft, mount the cam switch while pushing the external rim of the cam switch in the direction shown by the arrow.
   (If the hole D of the cam switch and the cutout D of the phase gear shaft are not matched (overlapped), turn the cam switch until the hole D matches.)

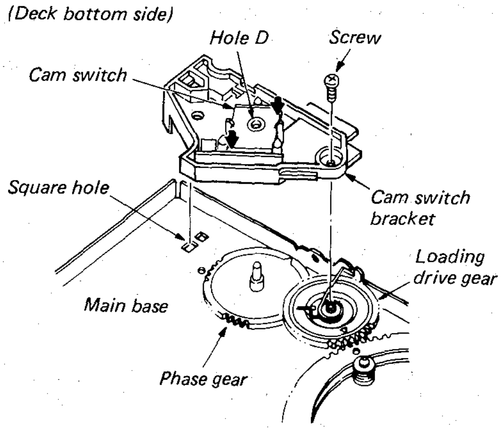

(Deck bottom side)
Hole D
Screw
Cam switch
Square hole
Cam switch bracket
Loading drive gear
Main base
Phase gear

Fig. 1-3-29 Cam switch replacement

1-3-8. T, S-Sensor Assemblies Replacement

1. Disconnect 3P and 6P connectors in T-sensor assembly, and 4P connector in S-sensor assembly.
2. Remove the screws.
3. Remove the sensor assemblies.
4. When reinstalling a new sensor, perform the previous steps in the reverse order.

Note:
Since the Hall element is glued on the sensor holder, take care the hall element is not torn off during installation.

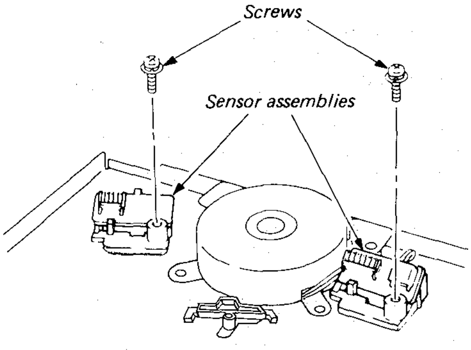

Screws
Sensor assemblies

Fig. 1-3-30 Sensor assemblies replacement

1-3-9. Main Brake Assembly Replacement

1. The brake assembly has the mold claws which allow one touch installation or removal.

Note:
When replacing, take care not to touch the brake pad surface.

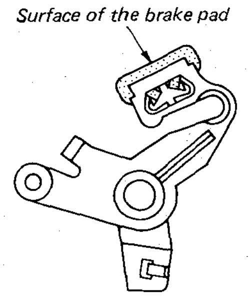

Surface of the brake pad

Fig. 1-3-31 Main brake assembly replacement

1-3-10. Ground Brush Replacement

1. Remove a screw and the brush.
2. Clean the ground cap with alcohol.
3. Replace the brush.
   Mount a new brush so that it can contact the center of the ground cap.

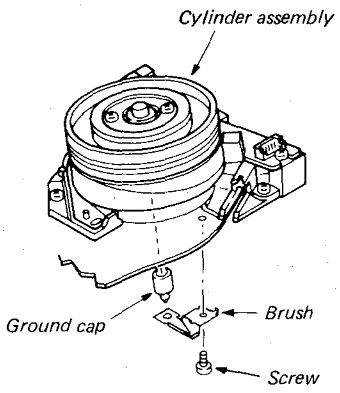

Cylinder assembly
Ground cap
Brush
Screw

Fig. 1-3-32 Brush replacement

1-3-11. Reel Table Replacement

(1) Supply reel table assembly

1. Remove the S-soft brake spring from the S-soft brake. (Fig. 1-3-33)
2. Remove the S-soft brake.
3. Remove the tension spring from the tension lever.
4. Remove the screw (A), then remove the tension lever and the band brake assembly.

Note:
Take care not to damage the mold claw of the band brake.

5. Remove the washer (A), then remove the S-reel table assembly upward paying attention not to miss the spacers.

Note:
Move the S-brake assembly in the direction shown by the arrow before removing the reel table. Take care not to touch the pad surface of the S-brake. (Fig. 1-3-34)

6. After cleaning the reel shaft with a cleaning kit, lubricate it with one or two drops of oil (lubrication kit).
7. When reinstalling the S-reel table assembly, temporarily move the S-brake assembly in the direction shown by the arrow, using a tweezer. (Fig. 1-3-34)

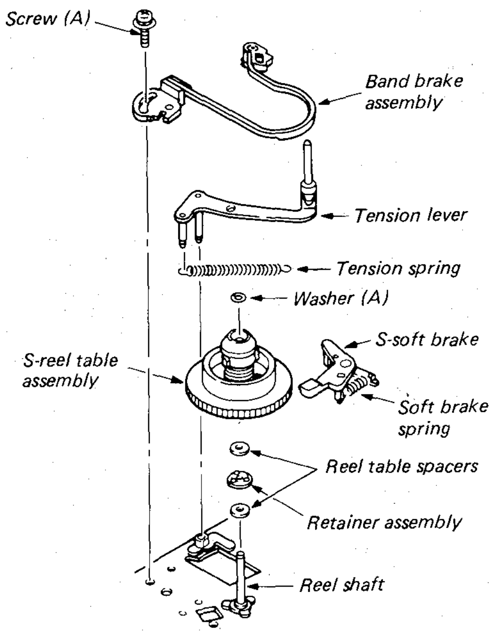

Screw (A)
Band brake assembly
Tension lever
Tension spring
Washer (A)
S-soft brake
S-reel table assembly
Soft brake spring
Reel table spacers
Retainer assembly
Reel shaft

Fig. 1-3-33 Supply reel table assembly replacement

8. Replace the spacers and the retainer assembly on the reel shaft when mounting the reel table on the deck.
9. Mount the tension lever and band brake assembly.

Note:
The mold claw of the band brake can be engaged smoothly into the hole of tension lever by pushing it slightly. Take care not to deform the mold claw and the tension lever by forcing them.

10. Hook the tension spring onto the tension lever.

Note:
In this case, take care not to give permanent deformation to the spring.

11. Mount the S-soft brake.
12. Mount the soft brake spring.

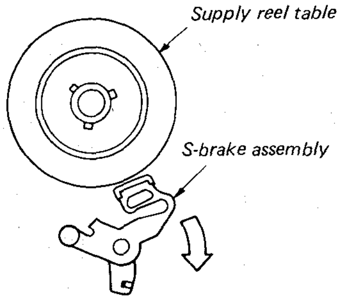

Supply reel table
S-brake assembly

Fig. 1-3-34 S-brake assembly

(2) Take-up reel table assembly

1. Remove the reverse brake spring from the reverse brake assembly.
2. Remove the reverse brake assembly from the main base.
3. Remove the T-soft brake spring from T-soft brake assembly.
4. Remove the T-soft brake assembly from the main base.
5. Remove the washer (A), then move the T-brake assembly in the direction shown by the arrow before removing the T-reel table assembly. Take care not to touch the pad surface of T-brake assembly.
6. As the bearing is stained with oil, the reel table spacers and thrust washer may stick to the T-reel table assembly and be removed with it. Take care not to miss them.
7. Clean the reel shaft using a cleaning kit, and apply one or two drops of oil (lubrication kit) after the reel shaft has dried.
8. Replace the take-up reel with a new one.
9. When mounting the take-up reel table, move the T-brake assembly in the reverse direction shown by the arrow with tweezers.
10. Replace the spacers and the thrust washer on the reel shaft when the reel table mounts on the deck.

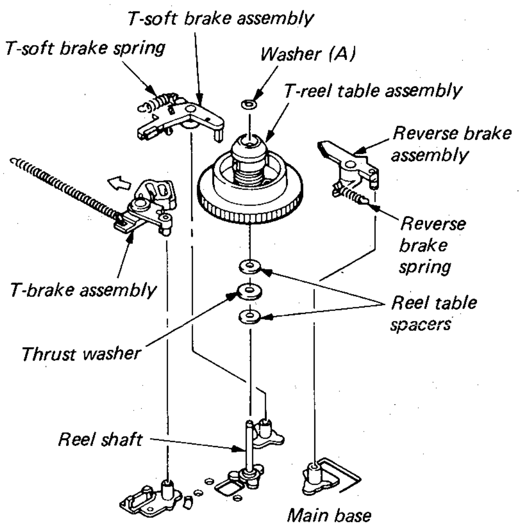

T-soft brake assembly
T-soft brake spring
Washer (A)
T-reel table assembly
Reverse brake assembly
Reverse brake spring
T-brake assembly
Reel table spacers
Thrust washer
Reel shaft
Main base

Fig. 1-3-35 Take-up reel table assembly replacement

1-3-12. Idler Assembly Replacement

Assume the front loading assembly is removed.

1. Removal of reel motor assembly (Fig. 1-3-36)
   Turn over the set, and remove two screws (A) and two screws (B). Disconnect the 3P connector of the reel motor from the T-sensor assembly. Move the idler assembly in the direction shown by the arrow, then lift the reel motor assembly in the directions shown by the arrow to remove it.

   After the reel motor was replaced, be sure to make adjustment of the reel torque referring to the item (2) in 1-4-3.

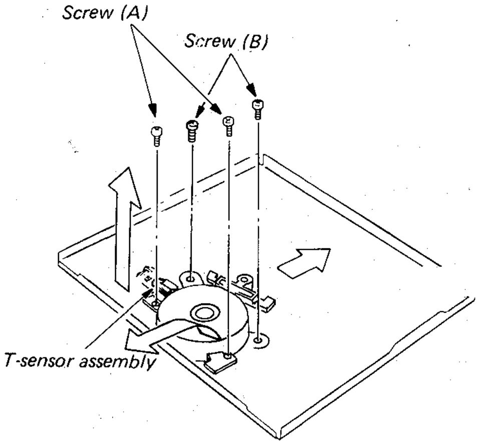

Screw (A)
Screw (B)
T-sensor assembly

Fig. 1-3-36 Removal of reel motor assembly

Notes:

* Before remounting, always clean knurling surface of the motor pulley, using the cleaning kit. This is to prevent oil, dust, etc. from sticking on surface of the idler rubber.

* Screws (A) and (B) are different in length.

2. Removal of idler stop bracket. (Fig. 1-3-37).
   Remove two screws (A), then remove the idler stop bracket.

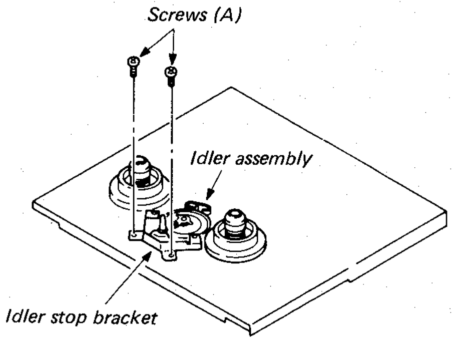

Screws (A)
Idler assembly
Idler stop bracket

Fig. 1-3-37 Removal of idler stop bracket

3. Remove the T-reel table assembly as previously stated. (Refer to 1-3-11 (2)).
4. Remove the polyslider. (Fig. 1-3-38)
5. Remove the idler spring from the post.
6. Move the idler assembly in the direction as shown by the arrow. (Fig. 1-3-38).

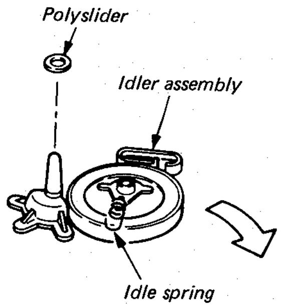


Fig. 1-3-38 Idler assembly replacement (1)

7. Confirm that the idler assembly is not caught with the main base. Lift the idler assembly upward.
8. When mounting, perform the previous steps in reverse order.
9. When mounting the idler assembly, be sure to grease. (Fig. 1-3-40)

Note:
Be sure to confirm that grease does not stain the rubber when the idler swings. Excessive amount of grease applied may stain the rubber.

10. Be sure to clean the idler rubber with the cleaning kit.

Note:
Make sure that the idler rubber is not stained with oil and dust. If stained, tape winding trouble may occur.

11. When assembling, perform the previous steps in reverse order.
    When the idler assembly was replaced, make sure to check reel torque adjustment referring to 1-4-3 (3).

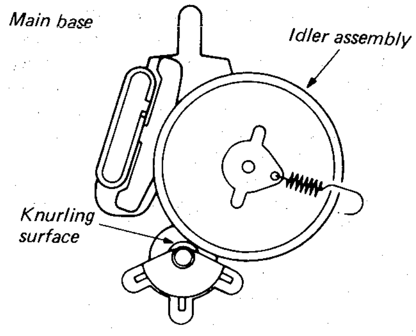


Fig. 1-3-39 Idler assembly replacement (2)

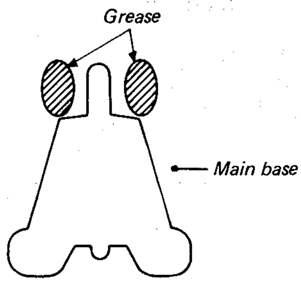


Fig. 1-3-40 Idler assembly replacement (3)

1-3-13. Capstan Motor Replacement

1. Remove the 6P connector from the capstan motor. (Fig. 1-3-41).
2. Remove the No. 9 guide lever assembly. (Refer to 1-3-3 (7))
3. Remove three screws and then the capstan motor. (Fig. 1-3-42)
4. Replace the capstan motor with a new one and mount it using the previous steps in reverse order.

Note:
After the capstan motor is replaced, check the tape transport system, referring to 1-4-4.

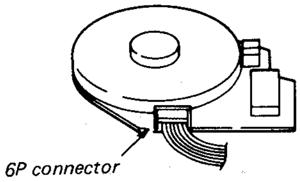


Fig. 1-3-41 Capstan motor replacement (1)

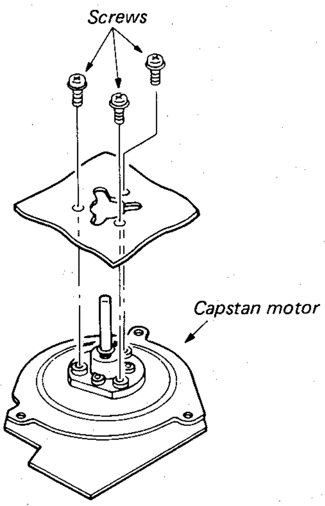


Fig. 1-3-42 Capstan motor replacement (2)

1-4. Check and Adjustment

1-4-1. Timing Check

(1) Cam gear and phase gear

1. Make sure the C-hole on the main base lines up with the holes on the cam gear and the loading drive base, if not, rotate the gear pulley assembly of the loading drive fully in the direction shown by the arrow to set FF mode. (Fig. 1-3-27)
2. Confirm the arrow mark of the phase gear is also aligned with the V-slot. If not aligned, adjust the timing by remounting the phase gear.

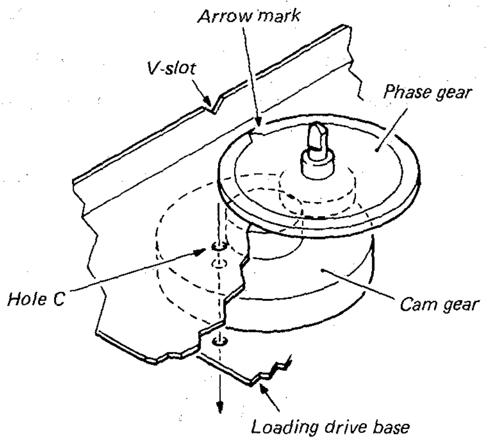

Arrow mark
V-slot
Phase gear
Hole C
Cam gear
Loading drive base

Fig. 1-4-1 Cam gear/phase gear

(2) Loading ring and loading drive gear

1. Make sure through the main base hole that holes of the S-loading ring and the T-loading ring are overlapped as shown by the arrow A. If they are not overlapped, adjust the location by removing the loading ring gear B.
2. Also make sure that the B-hole on the S-loading ring is coincided with the delta mark on the loading drive gear under the condition in the step 1 above. If they are not coincided, adjust the timing (location) by remounting the loading drive gear.

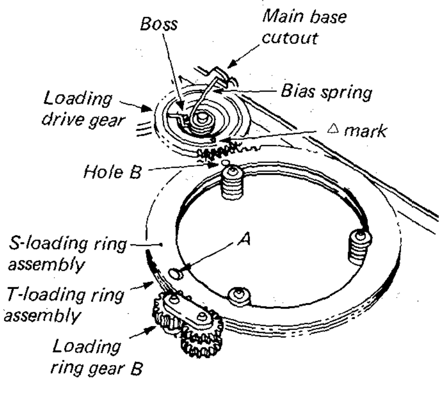

Boss
Main base cutout
Loading drive gear
Bias spring
△ mark
Hole B
A
S-loading ring assembly
T-loading ring assembly
Loading ring gear B

Fig. 1-4-2 Loading ring assembly/ loading drive gear

(When remounting the loading drive gear, make sure one end of the bias spring is hooked on the main base cutout and the other end is hooked on the boss of the loading drive gear.)

1-4-2. Check and Adjustment of Tension Pole Position

1. Set the deck to play mode with the front loading assembly removed.
2. Make sure the center of the tension pole is in alignment with the left edge of No. 1 guide post (±1mm) as illustrated.
3. If necessary, loosen the screw (A) and adjust the mounting position of the band bracket.

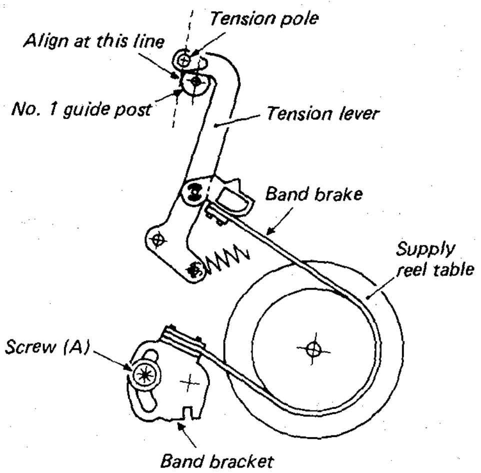

Tension pole
Align at this line
No. 1 guide post
Tension lever
Band brake
Supply reel table
Screw (A)
Band bracket

Fig. 1-4-3 Tension pole position

1-4-3. Reel Torque

(1) Reel torque

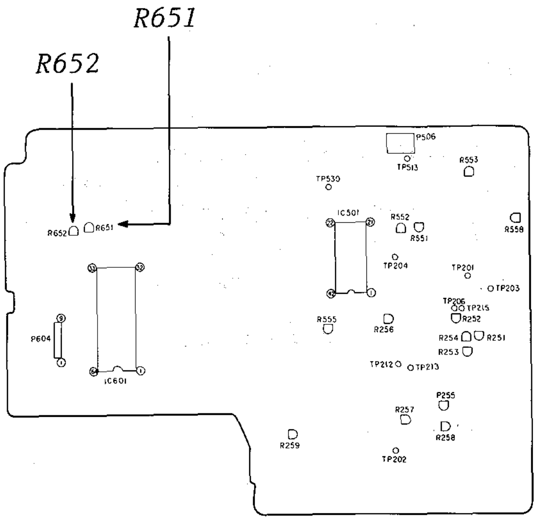
1. When in REVIEW mode
   Excessive torque will cause damage to the tape during REVIEW mode, while poor torque may not wind the tape.
2. Record/Playback (take-up side) mode
   Too little torque does not rewind the tape to the end. If too large the tape may be stretched by excessive tension.
3. FF mode (take-up side)
   REW mode (supply side)
   Too little torque does not rewind the tape to the end or takes too much time for rewinding.
4. Inspection
   Rewind the torque cassette to the end, then check the torque values shown below.
   Record/Playback 70 - 90g-cm
   Review 190 ± 10g-cm

Notes:

* If the reel torques are out of limits, clean the rubber surface of the idler assembly, the reel motor pulley, the reel table assembly, etc.
* Replace the idler assembly, if its rubber is hardened or worn out.
* Replace the brake pad of the main brake, if it is worn out.
* If the specified torque value is not obtained, replace the reel idler assembly.

(2) Reel torque adjustment

1. First, record a TV broadcast program on the entire torque cassette tape (KT-300NR).
2. Load a torque cassette in the VTR and feed forward the tape before proceeding with measurement.
   Connect test pins TP509 and TPG51 temporarily.
3. Set the VTR to the REVIEW mode and adjust R651 until the REVIEW take-up torque of 190 ± 5g-cm is obtained while observing the left torque meter.
4. Disconnect pins TP509 and TPG51 connected previously. After completion of step 3, set the VCR to the PLAY mode.
   In this case, push the STILL/PAUSE button as soon as the play mode has been set. Wait several seconds and then set the VTR to the PLAY mode again.
   Read the right torque meter and adjust R652 so that the PLAY take-up torque of 80 ± 10g-cm is obtained.
5. When the reel motor assembly or the idler assembly is replaced, perform confirmation and adjustment of the reel torque. Perform the reel torque adjustment in the order of item 3 and 4.
   Torque value will change if the confirmation is performed in the reverse order.
6. Confirmation and adjustment of the back tension will be performed with the front loading mechanism removed from the set and terminals 1 and 6 of P604 (Main P.C. Board) short-circuited, using a back tension cassette gauge.
   First, make sure that the tension pole is positioned correctly by referring to (item 1-4-2).
   Load a back tension cassette and set the VTR to the PLAY mode.
   Make sure the meter is indicating 16 - 26 gf-cm.
   If the value is out of limit, first make sure the tension level spring is normal, and then replace the band brake assembly as required. (Refer to item 1-3-6).



Main P.C. Board

PRECAUTIONS FOR USE OF TORQUE CASSETTE (KT-300NR)

1. Before loading a torque cassette in a VTR, always remove tape slack. The tape slack can be removed by rotating the reel to its take-up direction. (The tape tends to slack when there is no reel brake actions.)
2. When the torque cassette is slotted in, confirm followings:
   a. Make sure the tape does not ride up or over the No. 8 cap. If it does, do not eject the tape but bring the tape to its correct position, taking care not to damage the tape.
   b. Make sure the tape is not slackened, if slackened, operate the VTR in FF or REW mode and then stop the tape. Then make sure the tape is not slackened again.
   c. After above confirmation, proceed to the reel torque adjustments and confirmation.
3. Cautions for removal of torque cassette
   a. When removing the torque cassette from the VTR, set the VTR to the STOP mode and wait for several seconds. Then, make sure the tape is not slackened. Push the EJECT button to remove the cassette.
   b. When removing the torque cassette from the VTR, also make sure the tape is not slackened inside the cassette lid before pulling the cassette from the VTR. If the tape is slackened inside the lid, carefully bring the tape in place and then pull the cassette.
4. Cautions for playback operation
   a. When making adjustments and confirmation in the PLAY mode, first push the PLAY key, and then push STILL/PAUSE key to set the STILL mode. Run the VTR for several seconds in the STILL mode. Release the STILL mode and set the PLAY mode.
      Then perform the reel torque adjustment and confirm all functions work properly.
5. If the previous precautions 1, 2, 3 and 4 are not performed properly, the tape may be damaged and correct measurement can not be performed.
6. Do not use worn out or damaged tape, if used they may damage video heads on the cylinder. In such a case always replace the tape with a new one.
   The replacement tape is of E-120 type, 6.01m ± 0.3m in length.

1-4-4. Tape Transport System

The tape transport system has been precisely adjusted in the factory, so no check and alignment are necessary except the followings:

- * Noises observed on the screen
- * Tape damage
- * Parts, shown in the adjustment procedures for the tape transport system, item 1-3-3, were replaced.

<Adjustment reference>

Lower flange height of No. 8 guide is used as the basic reference for the transport adjustment, so do not move the No. 8 guide except replacing the No. 8 guide sleeve.

(1) Location of tape transport adjustment

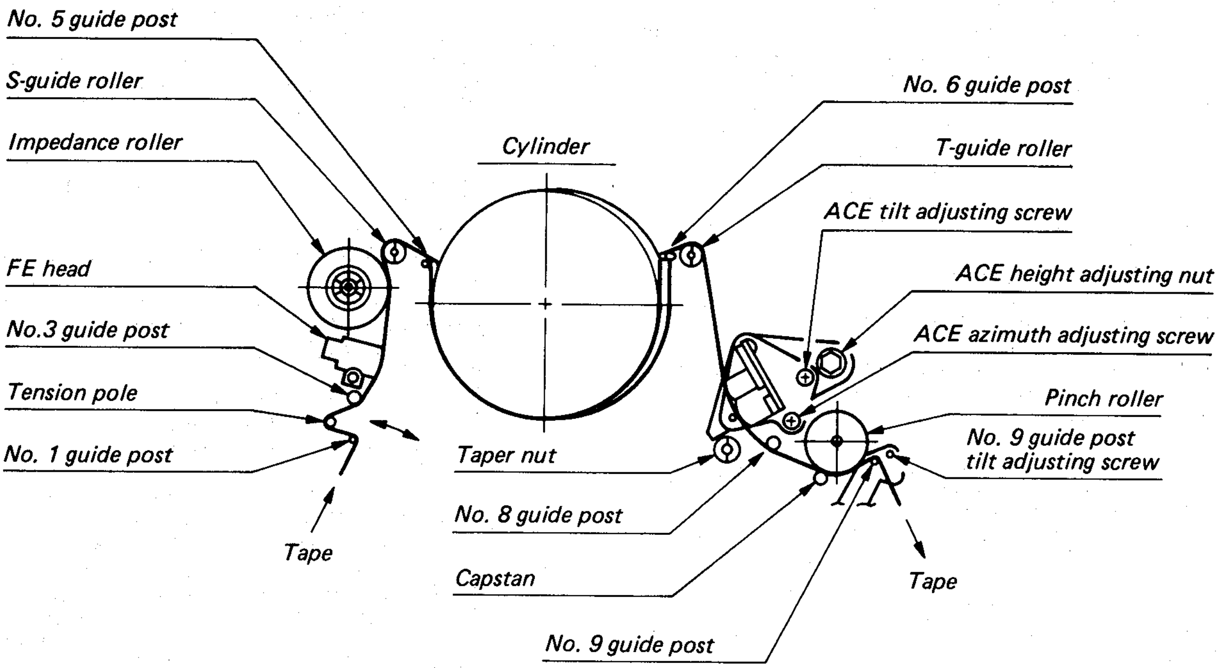

No. 5 guide post
S-guide roller
Impedance roller
FE head
No.3 guide post
Tension pole
No. 1 guide post
Tape
Cylinder
Taper nut
No. 8 guide post
Capstan
No. 9 guide post
No. 6 guide post
T-guide roller
ACE tilt adjusting screw
ACE height adjusting nut
ACE azimuth adjusting screw
Pinch roller
No. 9 guide post tilt adjusting screw
Tape

Fig. 1-4-4 Location of tape transport adjustment

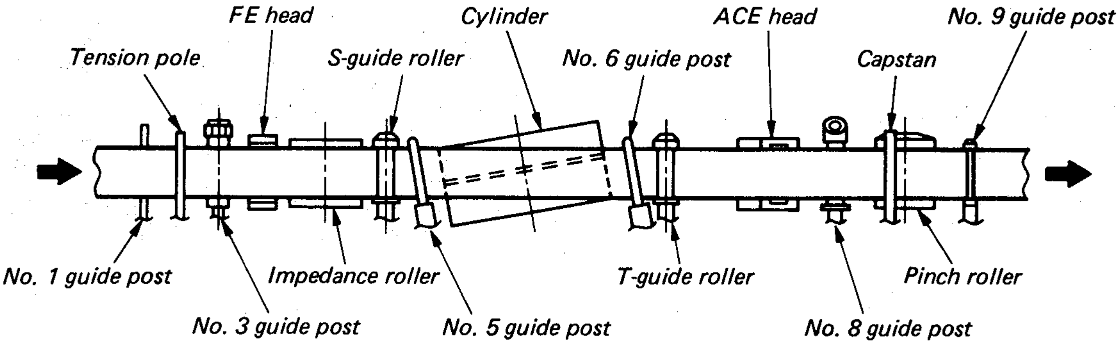

Tension pole
FE head
S-guide roller
Cylinder
No. 6 guide post
ACE head
Capstan
No. 9 guide post
No. 1 guide post
Impedance roller
No. 3 guide post
No. 5 guide post
T-guide roller
No. 8 guide post
Pinch roller

Fig. 1-4-5 Tape travel diagram

(2) Tape transport system adjustment

*** Pre-adjustment**

When the part(s) listed in Table 1-4-1 is replaced, perform required adjustments by referring to procedures for the tape transport system.

When the part(s) listed in Table 1-4-1 is replaced, the tape path may be changed and may damage alignment tape. To prevent this, first run a E-240 tape and make sure excessive tape wrinkle does not occur at each tape guide.

1. If tape wrinkle is observed at the No. 3 guide, make sure of the preset height of the guide again.
2. If tape wrinkle is observed at the S, T-guide rollers, turn the S, T- guide rollers for no wrinkle.

Table 1-4-1

Part replacement	Adjustment procedure
* Cylinder complete assembly * S, T sliders * ACE head assembly * Capstan motor assembly * Pinch lever assembly * Cylinder motor	From item 1)
* Upper cylinder	From item 2)
* S, T guide rollers * Tension lever assembly * Impedance roller * FE head * No. 3 guide sleeve	From item 3)
* Reel motor sub-assembly * Reel table (S, T) * Taper nut	From item 4)
* No. 9 guide lever	From item 5)

*** Adjustment procedures**

1) ACE head assembly adjustment

a. ACE tilt adjustment

1. Play back a E-240 tape and observe running condition of the tape at the lower flange of No. 8 guide.

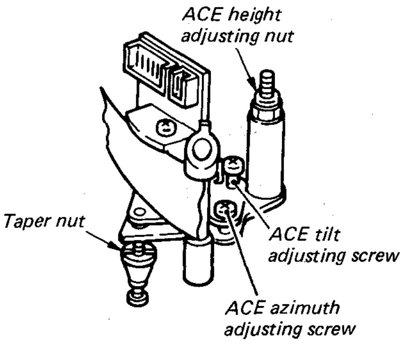


Fig. 1-4-6 ACE head assembly

2. Adjust the ACE tilt adjusting screw until tape wrinkle is caused at the lower flange of No. 8 guide as shown in Fig. 1-4-7(a).
3. Turn the ACE tilt adjusting screw counterclockwise until the tape travels along the lower flange as shown in Fig. 1-4-7(b).

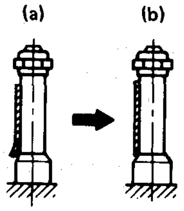


Fig. 1-4-7 No. 8 guide check

b. Audio azimuth adjustment

1. Play back the alignment tape, 7 kHz portion of audio signals.
2. Connect a millivoltmeter to the audio line output terminal.
3. Turn the ACE azimuth adjusting screw to obtain maximum audio output.

c. Audio head height adjustment

1. Run the alignment tape in the playback mode.
2. Observe surface of the audio head using a dental mirror.
3. White ceramic is provided on both sides of the audio and control heads of the ACE head assembly.
   Turn the ACE height adjusting nut so that lower tape edge matches to the upper edge of the ceramic on the lower head.
   If the previous method is deficient, play back the 400 Hz portion of the alignment tape and adjust for maximum audio output.

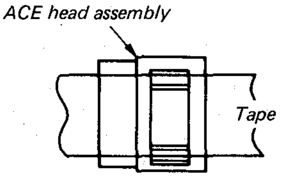


Fig. 1-4-8 Head height

d. ACE head position pre-adjustment

Note:
Before proceeding with this adjustment, remove adhesive cement applied on the taper nut.

1. Play back the alignment tape.
2. Adjust the taper nut for maximum video envelope output after the tracking control is set at its center position.

2) Servo circuit adjustment

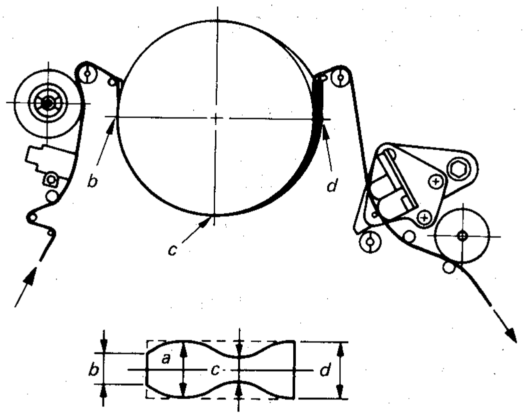
Proceed to PG1, PG2 and Tracking adjustments for servo circuit in "2. ELECTRICAL ADJUSTMENT".

3) Linearity adjustment (S, T-guide rollers adjustment)

1. Play back the alignment tape.
2. Observe the signal video envelope on an oscilloscope display triggered by the video switching pulse.
3. Make sure the video envelope waveform (in its maximum output) meets the specification shown in Fig. 1-4-9. If not, adjust as follows:

Note:
a = maximum output of the video envelope
b = minimum output of the video envelope at the entrance side
c = minimum output of the video envelope at the center point
d = minimum output of the video envelope at the exit side

4. In the same way check the envelope.



c/a ≧ 0.75 : b, d/a ≧ 0.63

Fig. 1-4-9 Envelope waveform adjustment

5. If the A section in Fig. 1-4-10 does not meet the specification, adjust the S-guide roller in up or down direction.
6. If the B section in Fig. 1-4-10 does not meet the specification, adjust T-guide roller in up or down direction.

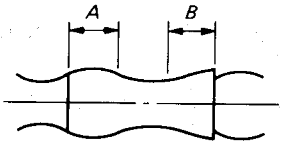


Fig. 1-4-10 Adjustment points

7. After completion of the adjustment(s), turn the tracking control and make sure video envelope variations are almost flat.
8. If the envelope varies as shown in Fig. 1-4-11, adjustment of the S, T-guide rollers may be upset, if so perform the adjustment again.

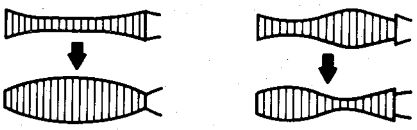


Fig. 1-4-11 Abnormal variation of the waveform

4) ACE head assembly fine adjustment

a. Tape wrinkle check at the lower flange of No. 8 guide

1. If tape wrinkle is observed at the lower flange of No. 8 guide, adjust the ACE tilt adjusting screw counterclockwise as shown in Fig. 1-4-6 until the wrinkle disappears.
2. If a gap is observed between the lower flange of No. 8 guide and the lower edge of tape, adjust the ACE tilt adjusting screw clockwise until the tape travels along the lower flange.

Note:
This adjustment should be made using a beginning part of E-240 tape.

b. Azimuth adjustment

1. Play back the 7 kHz audio signal on the alignment tape.
2. Adjust the ACE azimuth adjusting screw for maximum audio output as shown in Fig. 1-4-6.

c. ACE head position adjustment

1. Play back the alignment tape.
2. Place the tracking control at its center click position.
3. Trigger an oscilloscope with the video switching pulse and observe the video envelope waveform.
4. Turn the taper nut counterclockwise until the ACE base reaches the lower taper end of the taper nut as shown in Fig. 1-4-12.

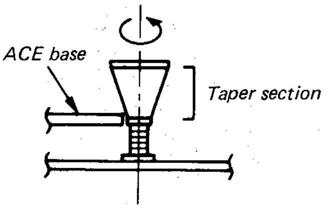


Fig. 1-4-12 Taper nut and ACE base

5. Turn the taper nut slowly counterclockwise and fix the taper nut at the position where the video envelope reaches a first peak level.
6. Play back the alignment tape.
7. Make sure the video envelope is at maximum with the tracking control set to the center click position.

Note:

* If no video envelope is observed with the tracking control set to the center position, perform the video envelope adjustment to obtain maximum video envelope in each mode, again.

* If maximum video envelope deviates within ± 6msec from the tracking volume center, perform a fine adjustment with the alignment tape to output maximum video envelope. Play back the alignment tape, and check the video envelope waveform is maximum with the tracking control set to the center position. (Deviation of the maximum point should be within ± 2msec.)

8. Play back the alignment tape and make sure the audio output is maximum.

Note:
After completion of the ACE head position adjustment, the ACE base must be positioned at approximately the center of the taper nut as shown in Fig. 1-4-13.

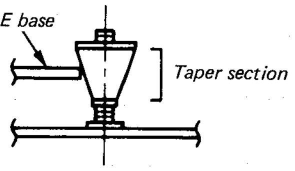


Fig. 1-4-13 Position of taper nut after adjustment

5) No. 9 guide lever adjustment

1. Set the VTR to Cue mode with E-240 tape loaded. Switch the Cue mode to the Review mode when the tape has been rewound into the T-reel table to some extent.
2. Check tape wrinkle at the upper and lower flange of No. 8 guide.
   If no tape wrinkle is observed along the lower flange, no adjustment is required.
3. If the tape runs along the upper flange or tape wrinkle occurs, turn the No. 9 tilting screw in Fig. 1-4-14 counterclockwise and adjust the screw until the tape runs along the lower flange.
4. If tape wrinkle occurs at the lower flange, turn the No. 9 tilting screw in Fig. 1-4-14 clockwise until tape wrinkle disappears.

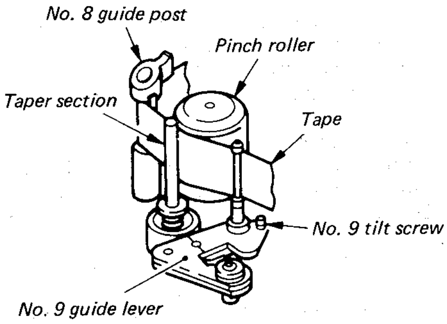


Fig. 1-4-14 No. 9 guide lever adjustment

6) Check for transitional operation from Review to Play

1. Play back the alignment tape in Review mode and observe the video envelope with an oscilloscope.
2. Switch the Review mode to the Play mode. When switched to the Play mode, make sure the entrance side envelope comes to an approximate steady state within 3 seconds as shown in Fig. 1-4-15.

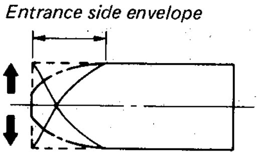


Fig. 1-4-15 Video envelope rising when operation mode is switch from review to play mode

If it does not rise within 3 seconds, adjust as follows:

3. Turn the No. 3 guide nut counterclockwise to adjust the lower flange height as shown in Fig. 1-3-21.
   Make sure the tape travels along the lower flange.
4. Play back an alignment tape. Since entrance side linearity varies as the height of No. 3 guide varies, adjust the S-guide roller to correct the linearity.
5. Change operation mode from the Review to the Play mode again and make sure the entrance side envelope rises within 3 seconds. If not, perform the adjustment again from item 3.
6. Play back the E-240 tape in the Play mode and make sure no tape wrinkle occurs at the lower flange of the No. 3 guide.
   If the tape is raised too high at the No. 3 guide, the tape will be damaged. So if tape wrinkle occurs, turn the No. 3 guide nut clockwise until the wrinkle disappears and then perform adjustment from item 4.

Note:
If the rising characteristic is poor in Review mode, screen noises may occur in synchronous editing recording.
Perform the adjustment carefully.

7) Envelope check

1. Make recordings on E-180 and E-240 tapes, and make sure the playback output envelope meets the specification shown in Fig. 1-4-9.
2. In playback using the same video deck as used for the recording, (with a E-180) the video envelope should meet the specification shown in Fig. 1-4-16.
3. If the performance does not meet both specifications 1 and 2 above, replace the upper cylinder assembly.
4. Confirm operation of the synchronous editing, using a beginning position of a E-180 tape.
5. If picture noises are observed at the starting position of the editing, adjust the preset height of the No. 3 guide again.

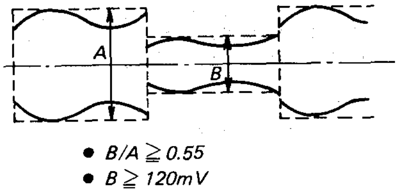


Fig. 1-4-16 Envelope output and output level difference

8) Tape wrinkle check

1. Play back the E-240 tape in the playback, Cue, Review and the frame feeding mode, and observe tape wrinkle at each guide.
2. If excessive tape wrinkle is observed at the mode shown below, perform the associated adjustments also shown below.

a. Playback mode
Tape wrinkle at the S, T-guide roller section
  Item 3: Linearity adjustment
Tape wrinkle at No. 8 guide flange
  Item 3: Linearity adjustment
Tape wrinkle at No. 3 guide flange
  Item 6: Check for transitional operations from Review to Play

b. Cue/Review mode
Tape wrinkle at No. 8 guide
  Item 5: No. 9 guide lever adjustment

c. Frame feeding mode
Tape wrinkle at No. 8 guide
  Item 3: Linearity adjustment

2. ELECTRICAL ADJUSTMENT

<Test equipments required>
Adjustment will be performed with the following test equipments.

1. Color TV (Monitor)
2. Oscilloscope, 2 CHs, 15 MHz or higher with delay system
3. Frequency counter (7 digits or higher)
4. Millivoltmeter
5. Digital voltmeter
6. Tester (20K ohm/V)
7. Audio generator
8. Audio attenuator
9. Alignment tapes
   Part code: ST-C1: 70909227
10. Alignment screw driver (jig)
11. Color pattern generator
12. Video sweep generator
13. Patch cord
   Part code: 70179076

<Color bar signal>
Color bar signals of 75% recorded on the alignment tapes are shown in Fig. 2-1-1.

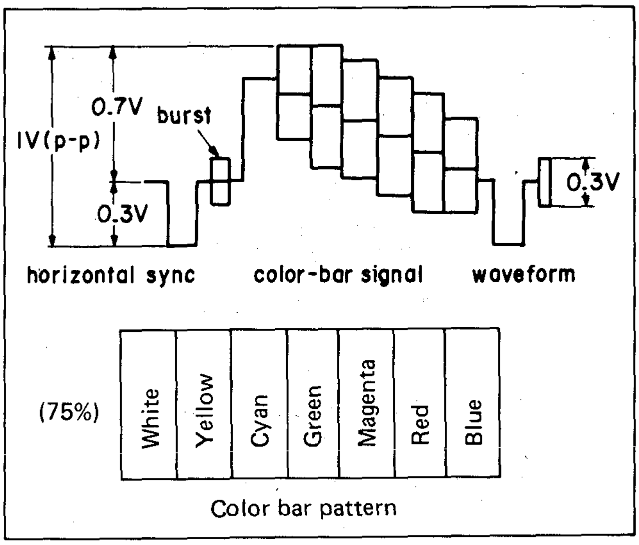


Fig. 2-1-1

<Specified input and output levels, and impedance>

Video input:	Negative sync, standard composite video signal 1Vp-p, 75 ohm
Video output:	Same as the video input. 1Vp-p, 75 ohm
Audio input:	-5 dBs, more than 10k ohm
Audio output:	-5 dBs, less than 1k ohm

<Alignment sequence>
Proceed the alignments in the sequence as shown in Fig. 2-1-2.

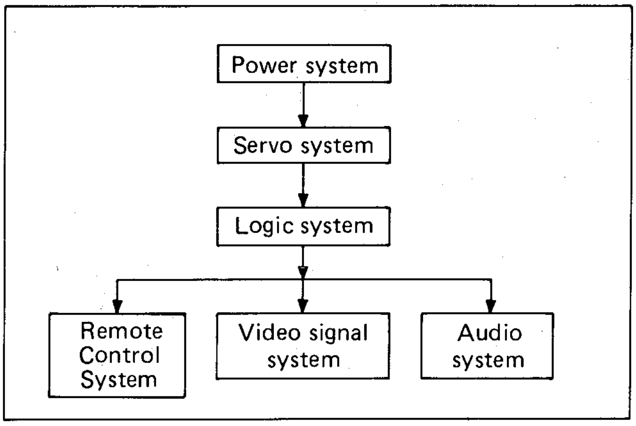
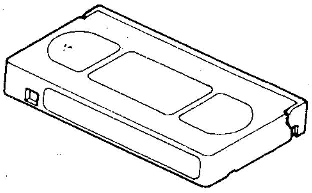

Power system
Servo system
Logic system
Remote Control System
Video signal system
Audio system

Fig. 2-1-2

Alignment tape specifications



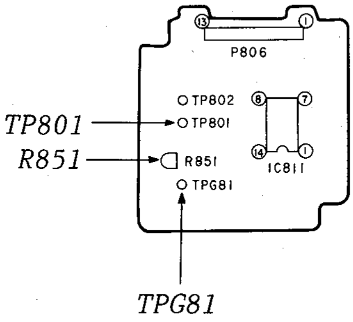
ST-C1

Segment	Mode	Playback Time (min.)	Video Signal	Audio Signal	Applications
1	PAL & SECAM	10	Mono Scope	1 kHz	Servo checks and adjustment
2	PAL & SECAM	10	3 MHz A-ch	400 Hz, 7 kHz	Tape path checks and adjustment
3	PAL	5	Color Bar	3 kHz	Video and Sound checks and adjustment
4	SECAM	5	Color Bar	3 kHz	Video and Sound checks and adjustment
5	MESECAM	5	Color Bar	3 kHz	Video and Sound checks
6	NTSC	5	Color Bar	1 kHz	Video and Sound checks

2-1. Power Supply Circuit

2-1-1. +12V adjustment

1. Connect the power plug to AC input rated voltage.
2. Set VTR to REC mode.
3. Connect DC voltmeter to TP801 (+12V) and TPG81 (GND).
4. Adjust trim pot R851 to obtain 12.0 ± 0.1V.

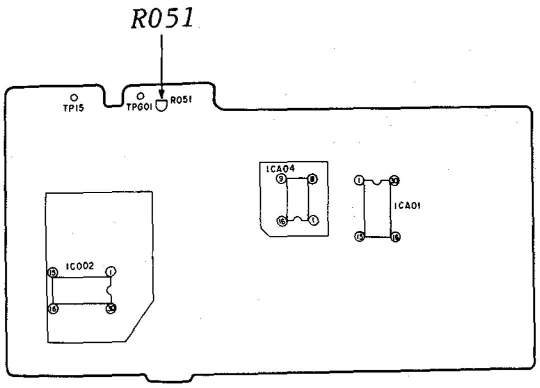

P806
⑬
①
TP802
TP801
R851
TPG81
⑧
⑦
⑭
①
IC811
TP801
R851
TPG81

Power 2 P.C. Board

2-2. PIF, Selector Circuit

2-2-1. AGC delay

1. Temporarily turn R051 fully clockwise.
2. Turn R051 slowly counterclockwise for minimum noise and sound buzz.

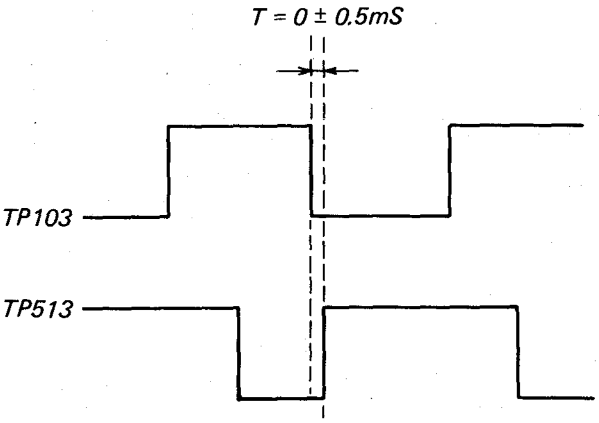

R051
TP15
TPG01
R051
ICA04
ICA01
IC002

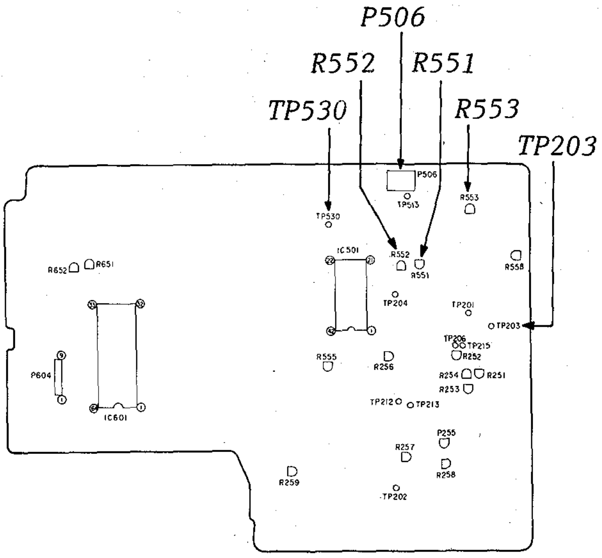
PIF P.C. Board

2-3. Servo Circuit

2-3-1. Tracking

1. Place the tracking control in the center click position.
2. Play back a recorded tape.
3. Set the oscilloscope to the chop mode.
4. Connect the A-CH input to pin 4 of P506 (SW pulse) and the B-CH to pin 2 of P506 (CTL pulse). Trigger the oscilloscope with the SW pulse.
5. Adjust R553 so that T becomes 0 ± 0.5ms as illustrated.

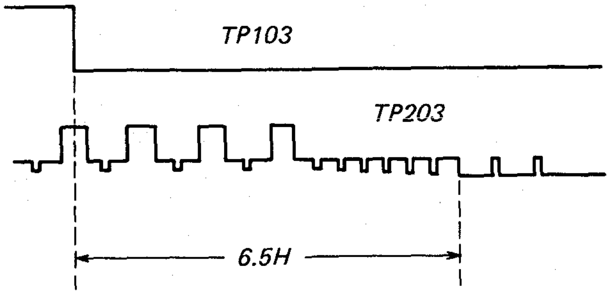

T = 0 ± 0.5mS
TP103
TP513


P506
R552
R551
TP530
R553
TP203
P506
TP513
TP530
R553
IC501
R552
R551
R558
R652
R651
TP204
TP201
TP203
TP206
TP215
R252
R555
R256
R254
R251
R253
P604
TP212
TP213
IC601
R255
R257
R258
R259
TP202

Main PC Board

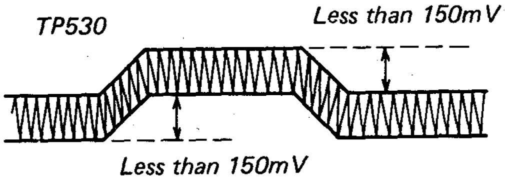
2-3-2. Playback phase (PG1)

1. Playback the alignment tape (ST-C1: PAL mode). (Tracking control knob at its center click position)
2. Set the oscilloscope to the chop mode, and externally trigger the scope with the SW pulse.
   Connect the A-CH input to the SW pulse (Pin 4 of P506) and the B-CH to the video signal (TP203).
3. Adjust R551 to position the falling edge of the SW pulse at 6.5H ± 0.5H from the V-sync front edge of the video signal.


TP103
TP203
6.5H

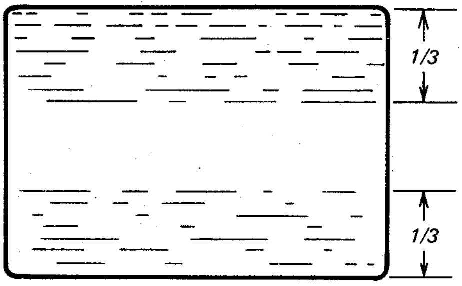
2-3-2. Playback phase (PG2)

1. Always perform this adjustment after the adjustment 2-3-1 has been completed.
2. Play back a recorded tape.
3. Set the oscilloscope to the chop mode and connect the A-CH input to pin 4 of P506 (SW pulse) and the B-CH to TP530 (cylinder motor drive voltage). Trigger the A-CH with the SW pulse.
4. Adjust R552 for minimum voltage ripple (less than 150mV).


TP530
Less than 150mV
Less than 150mV

2-3-4. Slow tracking

1. Place the slow tracking control in the center click position.
2. Play back a recorded tape.
3. Play back the tape in the slow mode and adjust R555 so that noise areas are located at 1/3 of upper and lower ends of the screen while observing the screen picture.



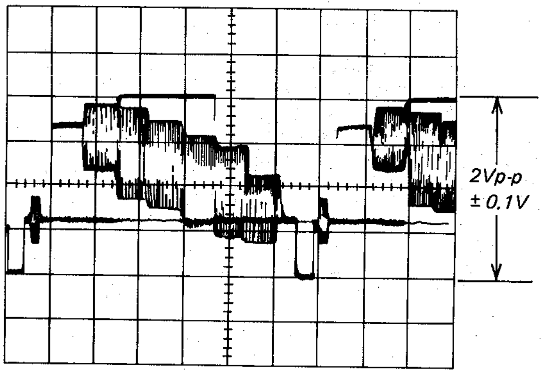
2-4. Video, Video 2 Circuit

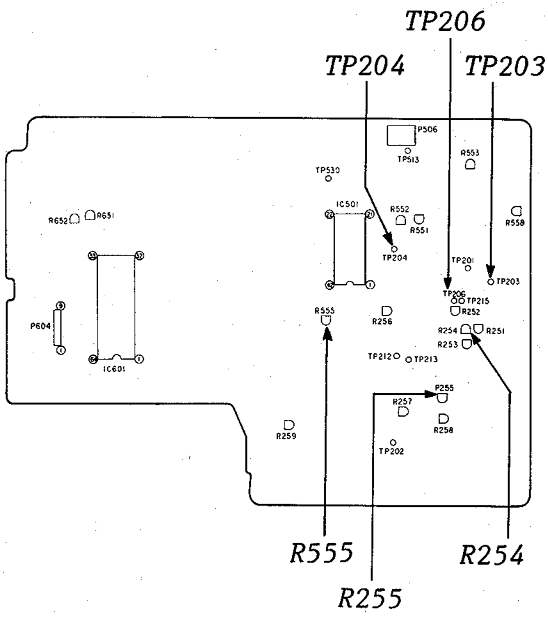
Note:

- * Place the HQ/EDIT/HQ PRO switch in the HQ position.
- * Set the channel to "0" when feeding signal to LINE terminals.

2-4-1. EE output level

1. Feed a color bar signal to the line input terminals and set the VTR to the EE mode.
2. Connect the oscilloscope to TP203 and trigger the scope with HD pulse at TP204. Adjust the scope so that a waveform is displayed for 2H period.
3. Adjust R255 until amplitude of 2.0Vp-p ± 0.1V is obtained between sync tip and 100% white level.

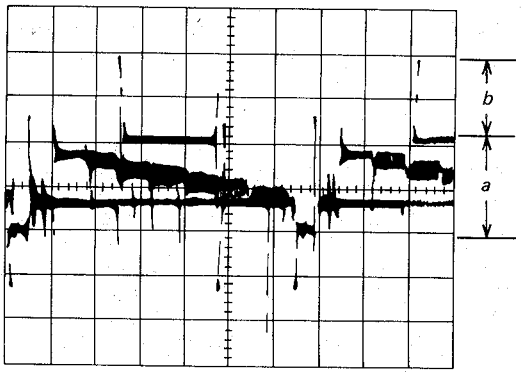



TP206
TP204
TP203
P506
TP513
R553
TP530
IC501
R552
R551
R558
R652
R651
TP204
TP201
TP203
TP206
TP215
R252
P604
R555
R256
R254
R251
R253
TP212
TP213
IC601
P255
R257
R258
R259
TP202
R555
R254
R255

Main P.C. Board

2-4-2. White clip

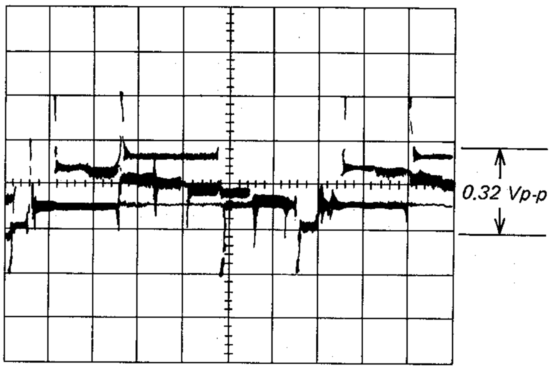
1. Feed the PAL color bar signal to the line input terminals and set the VTR to the EE mode.
2. Connect the oscilloscope to TP206 and trigger the scope with HD pulse at TP204. Adjust the scope so that a waveform is displayed for approx. 2H period.
3. Adjust R254 so that overshoot appearing the white peak side shows 90% ± 5% of the Y signal level.



a : b = 100 : 90

2-4-3. FM deviation

1. Feed the color bar signal to the line input terminals.
2. Connect the oscilloscope to TP215 and trigger the scope with a composite sync signal at TP204. Adjust the scope so that a waveform is displayed for approx. 2H period.
3. Adjust R252 to obtain the amplitude of approx. 0.32Vp-p between the sync tip and the white peak. After adjusting R256 (Playback Y signal output level) with the method 2-4-6, repeat above adjustment procedures, and then adjust R252 (FM deviation control) so that the playback Y signal output level at TP203 shows 2.0 ± 0.15Vp-p.



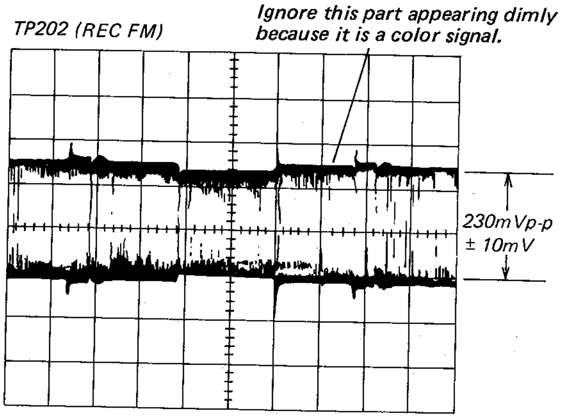
Horizontal axis: 10µs/div.
Vertical axis: 0.1V/div.

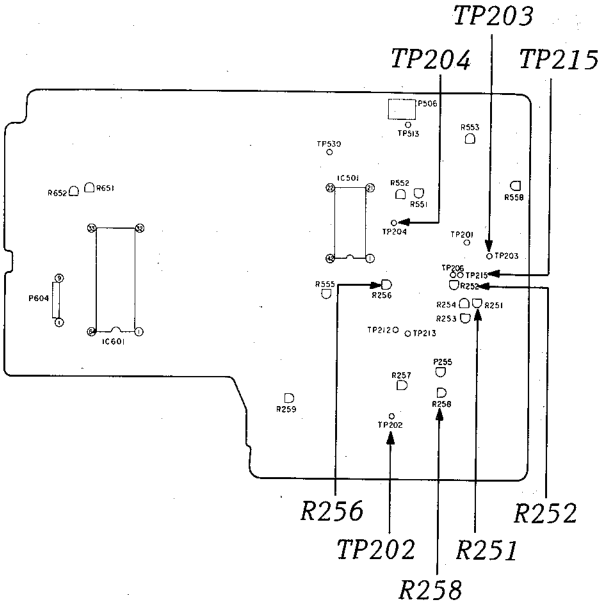
2-4-4. Sync tip frequency

1. Short circuit the line input terminals with a phone jack and set the VTR to the REC mode.
2. Connect the frequency counter to TP202.
3. Adjust R251 to obtain frequency reading of 3.85 ± 0.1MHz.

2-4-5. REC FM level

1. Feed a color bar signal to the line input terminals and set the VTR to the REC mode.
2. Connect the oscilloscope to TP202 and trigger the scope with HD pulse at TP204. Adjust the scope so that a waveform is displayed for approx. 2H period.
3. Adjust R258 so that amplitude of 100% white portion shows 230mVp-p ± 10mV.

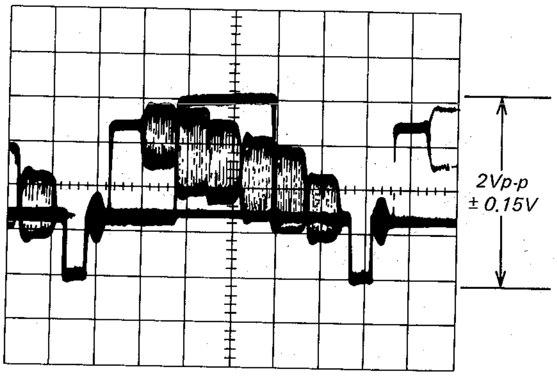



TP203
TP204
TP215
P506
TP513
R553
TP530
R558
IC501
R552
R551
R652
R651
TP204
TP201
TP203
TP206
TP215
R252
P604
R555
R256
R254
R251
R253
TP212
TP213
IC601
R255
R257
R258
R259
TP202
R256
R252
TP202
R251
R258

Main P.C. Board

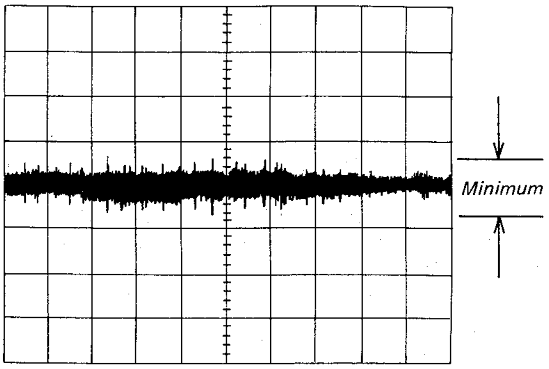
2-4-6. Playback Y signal output level

1. Play back the test tape (PAL color bar signal).
2. Connect the oscilloscope to TP203 and trigger the scope with HD pulse at TP204. Adjust the scope so that a waveform is displayed for approx. 2H period.
3. Adjust R256 so that amplitude of 2.0Vp-p ± 0.15V is obtained between the sync tip and the 100% white level.



2-4-7. Y comb-filter balance

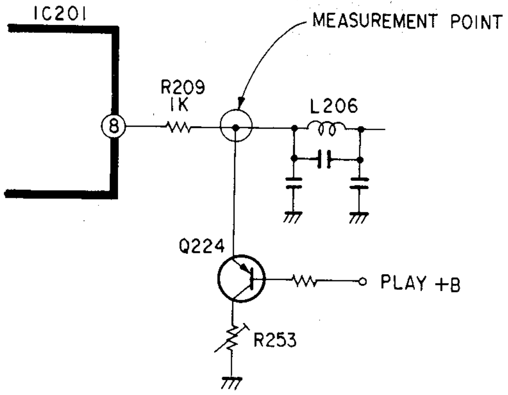
1. Play back the test tape (PAL color bar signal).
2. Connect the oscilloscope (CH-1) to TP212 and the (CH-2) to TP213, and trigger the scope with HD pulse at TP204. Adjust the scope so that a waveform is displayed for approx. 2H period.
3. Adjust the scope so that amplitude gain for each channel is the same.
4. Set polarity of the CH-2 to the negative (INV) mode.
5. Set the scope to ADD mode which adds signals in the CH-1 and CH-2.
   Adjust R257 so that amplitude on the scope display shows minimum. (Ignore glitches.)

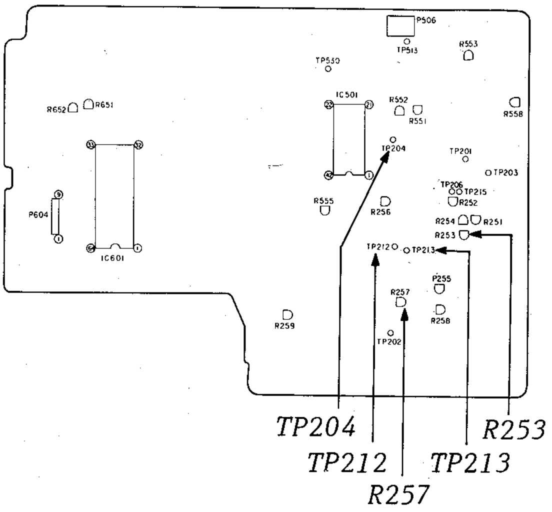


2-4-8. EE DC level

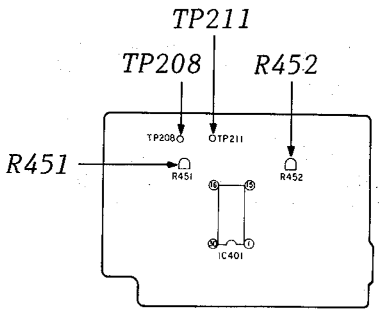
1. Connect a digital voltmeter (DC range) to the measurement point shown in the illustration.
2. Feed no signal to the LINE input. Record no signal and then play back the no signal just recorded while reading the voltmeter. Assure the voltage reading is A [V].
3. Set the VTR to EE mode. Adjust R253 so that the voltmeter shows A [V] + 0.10V ± 0.20V.

Note:
When readjustment is performed on "Playback Y signal output level", always perform this adjustment.





Main P.C. Board



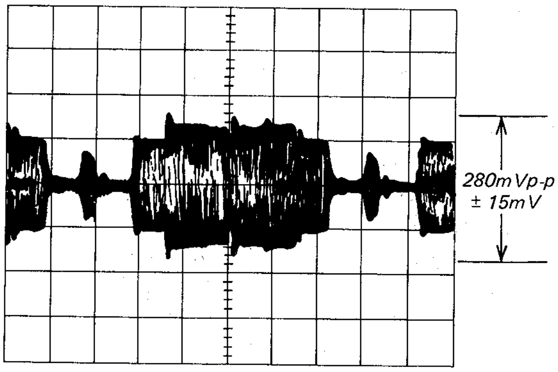
Video 2 P.C. Board

2-4-9. 4.43 MHz crystal oscillator frequency

1. Play back the test tape (PAL color bar signal).
2. Connect a frequency counter to TP211.
3. Adjust R452 until frequency reading of 4.433619 MHz ± 25 Hz is obtained.

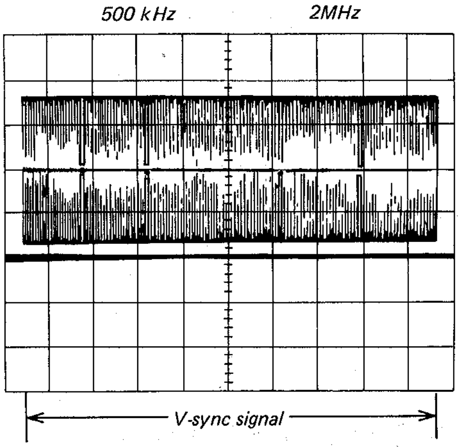
2-4-10. Color record current

1. Feed the PAL color bar signal to the line input terminals and set the VTR to the REC mode.
2. Connect the oscilloscope to TP208 and trigger the scope with HD pulse at TP204. Adjust the scope so that a waveform is displayed for approx. 2H period.
3. Adjust R451 so that amplitude of the red portion shows 280mVp-p 15mV.

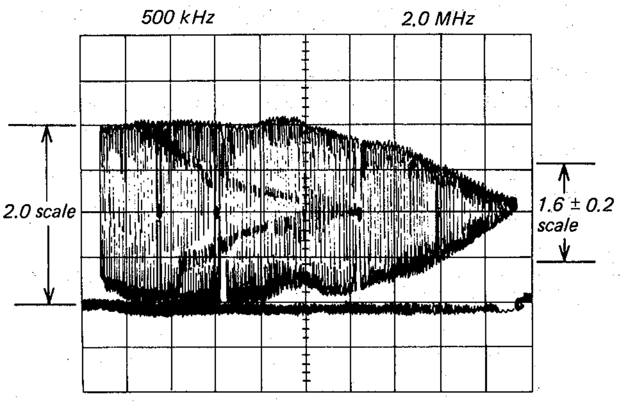


2-4-11. Picture sharpness preset

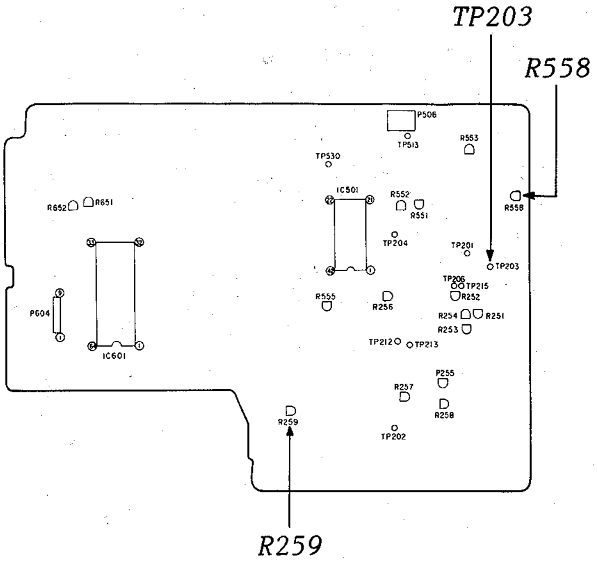
1. Place the sharpness control in its center click position.
2. Record and play back a video sweep signal fed to the line input terminals.
3. Connect the oscilloscope to TP203 and trigger the scope with a signal at TP103. Adjust the scope so that a waveform is displayed for more than 1V (vertical sync) period.
4. Adjust R259 so that relative amplitude at 2 MHz shows 1.6 ± 0.2 (scale), where amplitude at 500 KHz is assumed as "A" (A = 2 scale).
5. Confirm that 2 MHz level increases when the sharpness control is turned clockwise and decreases when turned counterclockwise. Then replace the control at its center click position.



Input sweep signal



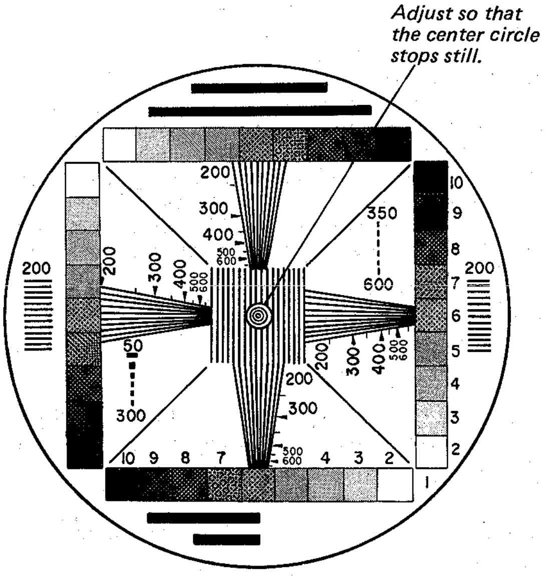
Playback waveform of TP203


TP203
R558
P506
TP513
R553
TP530
IC501
R552
R551
R652
R651
TP204
TP201
TP203
R558
TP206
TP215
R252
R555
R256
P604
R254
R251
R253
IC601
TP212
TP213
R255
R257
R259
R258
TP202
R259

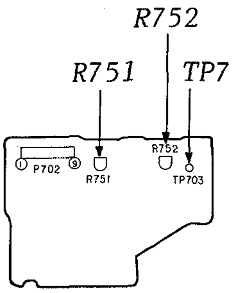
Main P.C. Board

2-4-12. V-sync correction

1. Play back the test tape (ST-C1: PAL monoscope signal) in double speed.
2. Adjust R558 (on rear of the unit) so that a circle at center of the monoscope pattern stops still or jitter disappears.


Adjust so that the center circle stops still.
200
300
400
500
600
350
600
200
200
300
400
500
600
50
300
200
300
10
9
8
7
6
5
4
3
2
1
200
10 9 8 7
500
600
4 3 2

2-5. Audio Circuit



Audio P.C. Board

Note:

* Adjustments for the playback frequency response and playback output level may not be performed if the audio control head is improperly positioned on the audio track. In such a case, perform the azimuth adjustment and height adjustment perfectly, and then proceed with the adjustments 2-5-1 to 2-5-5.

* When using alignment tapes other than those specified below always make sure that interchangeability is assured for the tapes before proceeding the adjustments.

2-5-1. Playback output level

1. Connect 10k ohm to the audio line output terminal and playback the alignment tape (ST-C1).
2. Adjust R751 until output level obtains -5 dBs ±0.5 dBs.

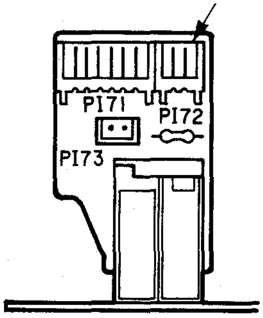
2-5-2. Record/Erase oscillator frequency

1. Connect the frequency counter across TP703 and GND.
2. Set the VTR to record mode and check that the frequency counter shows 68 kHz ± 6.8 kHz.

2-5-3. Bias current

1. Short circuit the audio line input terminal, creating a no input signal condition. Connect a millivoltmeter to pins 1 and 2 (GND) of PI72.
2. Set the VTR to the record mode and adjust R752 to obtain 3.0mVrms.

Connect a millivoltmeter to PI72



ACE Head P.C. Board

2-5-4. Record/playback frequency characteristics

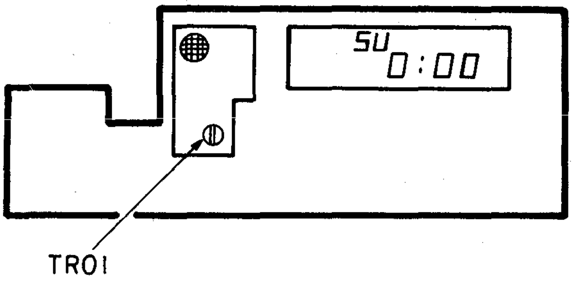
1. Connect a 10k ohm resistor to the audio line output terminal.
2. Apply 400 Hz and 8 kHz signals of -25 dBs to audio line input terminal, and record the signal.
3. Play back the signals just recorded and check that the output of 8 kHz is 0 dB ± 4 dB, referred to the output of 400 Hz.
4. If the 8 kHz output level is higher than that of 400 Hz by more than 4 dB, adjust the bias current to a value higher than 3.0mVrms; and if the 8 kHz output is lower than that by less than -4 dB, adjust the bias current to a value lower than 3.0mVrms.

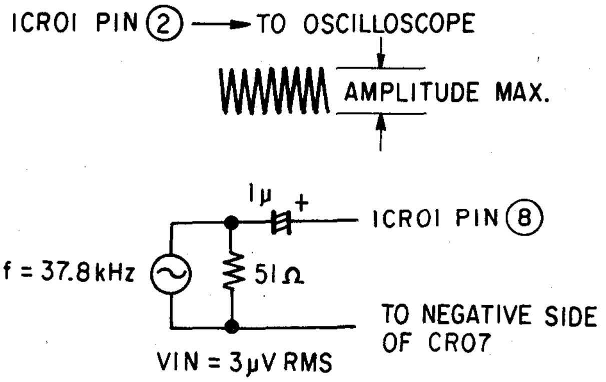
2-5-5. Record/playback output level

1. Connect a 10k ohm resistor to the audio line output.
2. Feed 400 Hz, -5.0 dBs signal to the audio line input terminal and record the signal.
3. Confirm to see the playback output level is -5 dBs ± 3 dB.

2-6. Wireless Remote Control Circuit

1. Connect the oscilloscope across pin 2 of ICR01 and ground. (Use a probe of 10 : 1.)
2. Feed a signal of 37.8 kHz with amplitude of 3μVrms across pin 8 of ICR01 and (-) side of CR07 through the network as shown.
3. Adjust TR01 for the maximum amplitude on the scope display.





SECTION 3
SERVICING DIAGRAMS

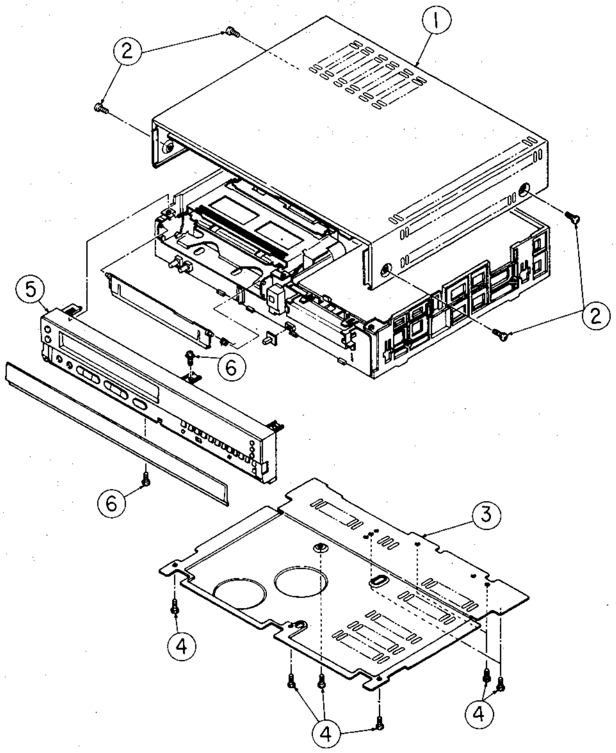
1. Inspection Procedure

Operation steps		Items to be confirmed	Inspection block	Page	
				Block Diagram	Circuit Diagram
1. AC Plug-in	Time setting Program timer setting	Clock display Time setting operation	Power (AC system)	3-9	3-35
			Timer counter		
			(V-93G)	3-14	3-51
			(V-93T)	3-14	3-55
			(V-93W)	3-14	3-55
			VPS (V-93G)	3-18	3-51
2. Power SW ON	Timer/counter, Channel selection, AFC operation, EE picture & tone quality	Mode display lamp TV receive condition Channel select operation, AFC operation level, EE picture quality, Tone signal level	Power	3-9	3-35
			Logic	3-20	3-59
			PIF, reception		
			(V-93G)	3-11	3-39
			(V-93T)	3-11	3-43
			(V-93W)	3-12	3-47
			Video (EE, Rec mode)	3-29	3-71
			Audio (EE, Rec mode)	3-32	3-75
3. Cassette-in and Cassette-out	Cassette-in Cassette loading Eject Cassette out	F/L mecha. operation Cassette loading operation Eject operation Indicator lamp Abnormal sound	Logic	3-20	3-59
4. Key entry Operation Remote-control	REC, PLAY Cue/Review Still, Frame feeding/slow FF/REW	Indicator lamp Each mode operation (Tape drive operation) Abnormal sound	Logic	3-20	3-59
			Remote control block		3-77
5. Special Functions Fully Automatic Play	Cassette-in at Power OFF	Power ON, Cassette down Automatic Play Power OFF after REW	Power	3-9	3-35
			Logic	3-20	3-59
Auto Rewind	REC/PLAY/CUE	Rewind automatically after tape wound			
6. Playback Function Picture Quality Tone Quality Others	PLAY (Test tape: ST-C1) Cue/Review Still/Slow	Resolution, S/N Hue, Saturation, Color unevenness, Color dropout, Sound distortion, Level variation, Picture noise, Jitter Picture swing, Skew distortion, Flicker, Beat	Video PLAY system	3-29	3-71
			Audio PLAY system	3-32	3-75
			Servo system	3-26	3-63
7. REC/PLAY Functions Picture Quality Tone Quality Others	REC/PLAY	Resolution, S/N Hue, Saturation, Color unevenness, Color dropout, Sound distortion, Level variation, Picture noise, Jitter, Picture swing, Skew distortion, Flicker, Beat	Video PLAY system	3-29	3-71
			Audio PLAY system	3-32	3-75
			Servo system	3-26	3-63

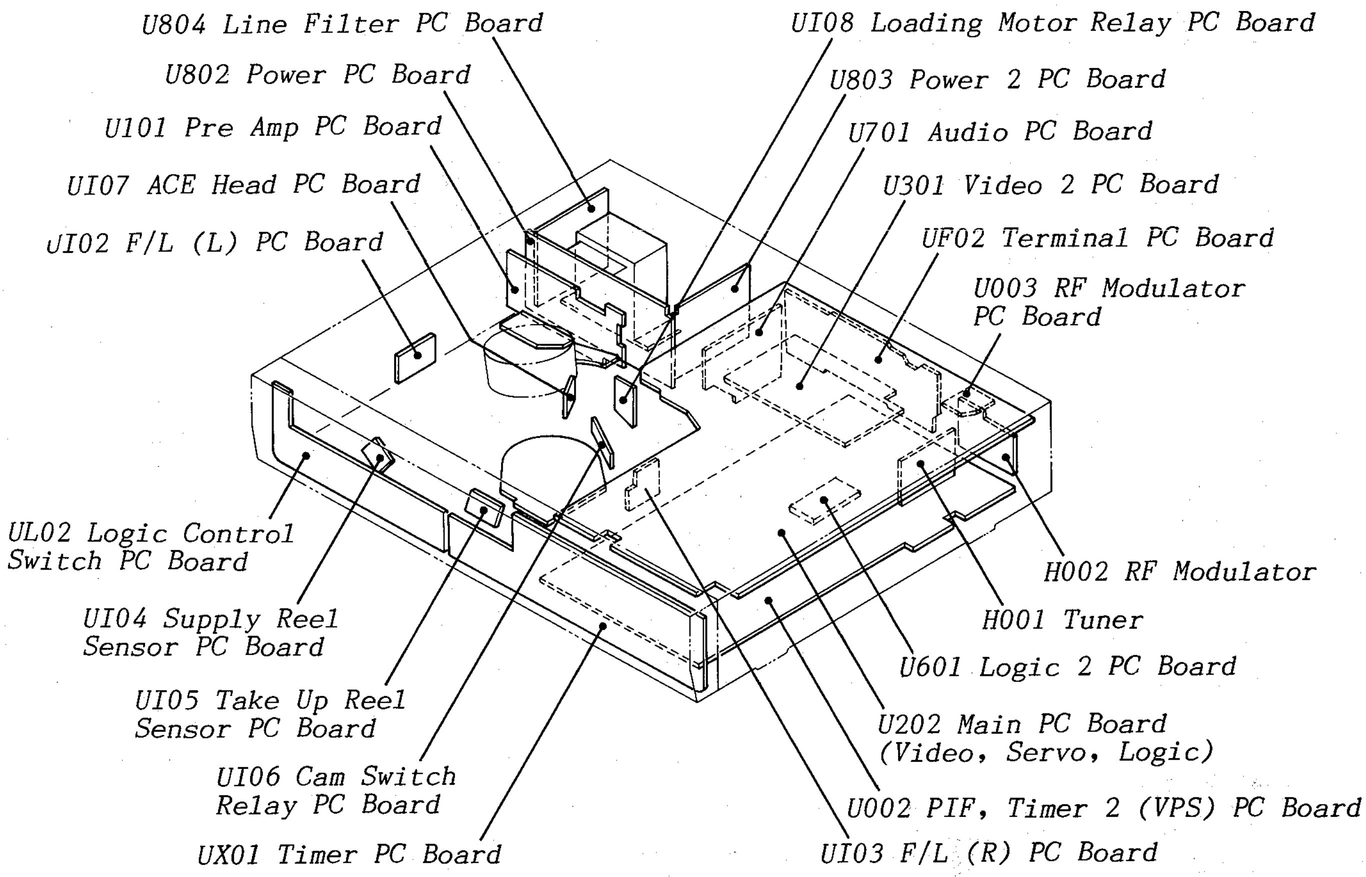
How to use the table
1. When inspecting a defective VTR, proceed according to the steps shown in the table.
2. Check the items to be confirmed for each operation step.
3. If a problem is found on the item, check waveforms (level) referring to the block diagram relating to the items.
4. Use PC board pattern diagram and schematic diagram to examine the circuit precisely.
5. After completion of the repair work, check steps 1 — 7 again.

2. Removal of Cabinet

1. Disconnect power cord plug from AC outlet.
2. Remove 4 screws ② securing top cover ①.
3. Remove the top cover ① by sliding it backward.
4. Remove 6 screws ④ securing bottom cover ③, then remove the bottom cover.
5. Remove 2 screws ⑥ securing front panel ⑤.
6. Remove the front panel ⑤.

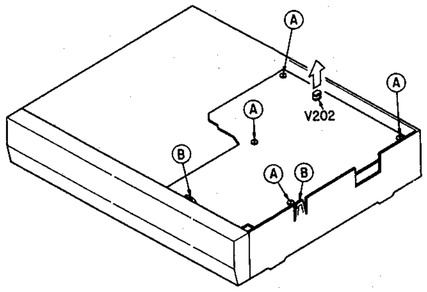

①
②
②
⑤
⑥
⑥
③
④
④
④

3. Electrical Units Location Diagram


U804 Line Filter PC Board
U802 Power PC Board
U101 Pre Amp PC Board
UI07 ACE Head PC Board
UI02 F/L (L) PC Board
UI08 Loading Motor Relay PC Board
U803 Power 2 PC Board
U701 Audio PC Board
U301 Video 2 PC Board
UF02 Terminal PC Board
U003 RF Modulator PC Board
UL02 Logic Control Switch PC Board
UI04 Supply Reel Sensor PC Board
UI05 Take Up Reel Sensor PC Board
UI06 Cam Switch Relay PC Board
UX01 Timer PC Board
H002 RF Modulator
H001 Tuner
U601 Logic 2 PC Board
U202 Main PC Board (Video, Servo, Logic)
U002 PIF, Timer 2 (VPS) PC Board
UI03 F/L (R) PC Board

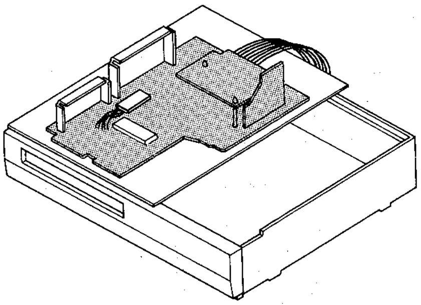
4. Standing PC Boards for Servicing

Main (Video, Servo, Logic), Video 2, Audio PC Board

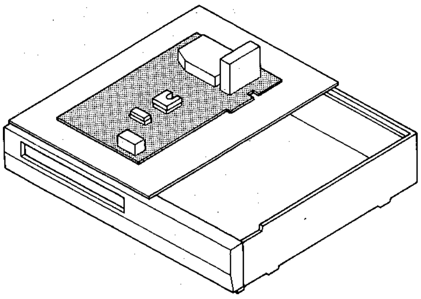


Note:

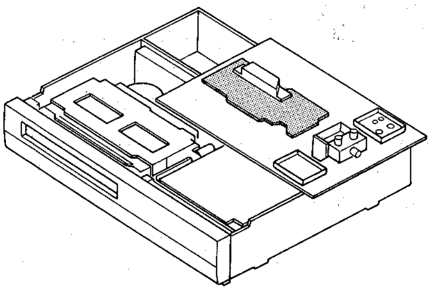
1. Remove 4 screws Ⓐ.
2. Unhook 2 claws Ⓑ fixing the main PC board.
3. Pull V202 upward and remove the main PC board, terminal PC board and connector (PF02, P206) to separate the PC board.
4. Connect the connectors PF02 and P206 using a patch cord (SN: 70179076)



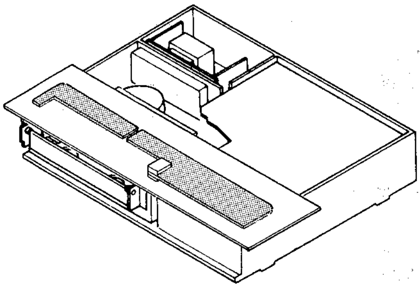
PIF, Timer 2 (VPS) PC Board



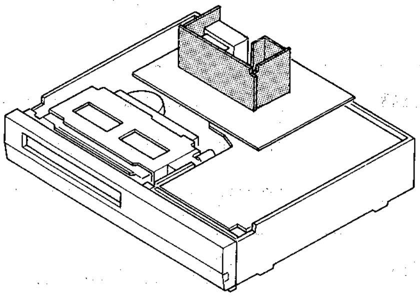
Terminal PC Board



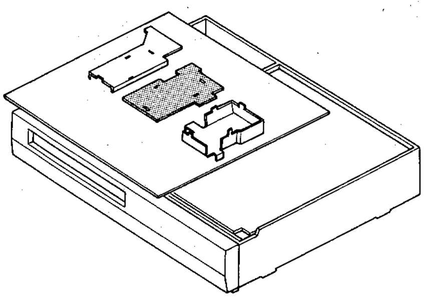
Timer, Logic Switch PC Board



Power, Power 2, Line Filter PC Board



Pre Amp PC Board



5. Part Configuration and their Symbols

1. ICs

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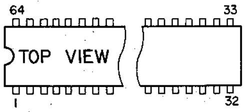
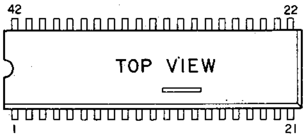
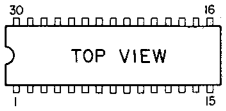
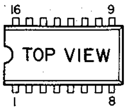
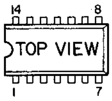
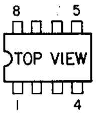
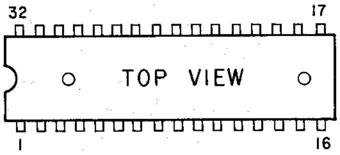
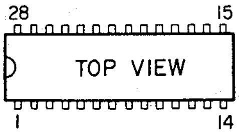
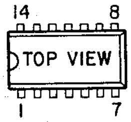
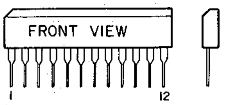
TMP47C460AN9255 TMP47C870N4844Z	 64 33 TOP VIEW 1 32
TD6361N-D5 TMP47C410AN6696	 42 22 TOP VIEW 1 21
M51365SP TA8632N TMP47C231AN4956	 30 16 TOP VIEW 1 15
TL8709P TC4053BP TD6350P	 16 9 TOP VIEW 1 8
AN3313 TA75339P TA75902P M58659P	 14 8 TOP VIEW 1 7
TA75358CP	 8 5 TOP VIEW 1 4
BA7258AS	 32 17 TOP VIEW 1 16
SAA5235	 28 15 TOP VIEW 1 14
SAF1135P	 14 8 TOP VIEW 1 7
TA8618S	 FRONT VIEW 1 12

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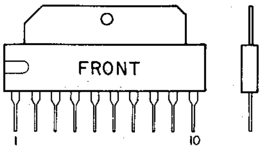
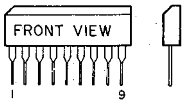
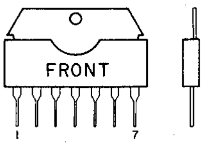
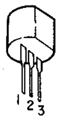
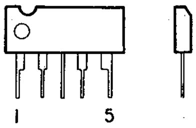
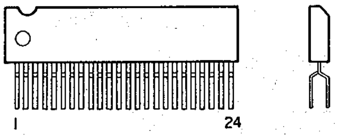
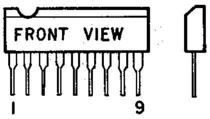
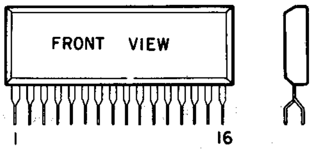
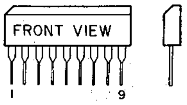
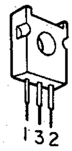
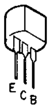
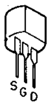
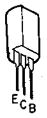
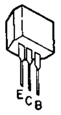
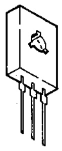
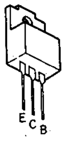
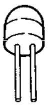
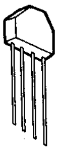
TA7288P	
UPC1474HA	 FRONT VIEW 1 9
TA7267P	
PST520D PST520C	
BA7755	
BA7751ALS	
BA7021	 FRONT VIEW 1 9
LA7311	 FRONT VIEW 1 16
LA7910	 FRONT VIEW 1 9
TA78L009AP	

2. TRANSISTORS

NAME	SHAPE
2SC388ATM 2SC1815-Y 2SC2878-A 2SC1959-Y	
2SK117-GRFA2	
2SA966-Y 2SC2236Y	
2SA1048-Y,RN2201 2SC2458-Y,RN1203 RN1201, RN2202, RN2206 RN1202, RN2204, 2SA1297GR RN1204, RN1206, RN2203	
2SD1379	
2SD1413 2SD1415 2SB1015 Y 2SD1405-BL	
PN202S-S.TH PN202S-R.TH	
THS103A	

3. DIODES

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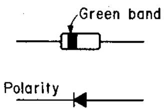
1SS176 1SS177	 Green band Polarity

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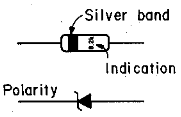
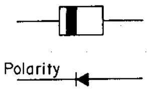
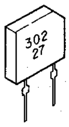
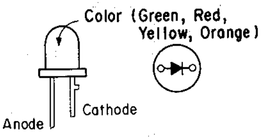
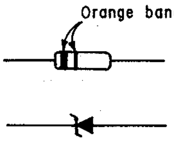
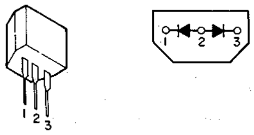
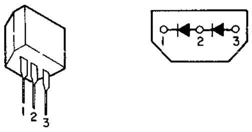
05Z7.5Y 05Z5.1X 05Z13Y 05Z12X 05Z5.6Y	 Silver band Indication Polarity
ERC04-02F 1SS1885	
PH-302	
GL450V TLG133A FA	 Color (Green, Red, Yellow, Orange) Cathode Anode
MA1330-M	 Orange band
1SS200	
1SS227	

PRECAUTIONS FOR PART REPLACEMENT

- * In the schematic diagram, parts marked ⚠ (ex. ⚠ F801) are critical part to meet the safety regulations, so always use the parts bearing specified part codes (SN) when replacing them.
- * Using the parts other than those specified shall violate the regulations, and may cause troubles such as operation failures, fire, etc.

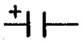
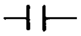
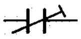
SOLID RESISTOR INDICATION

Resistor	1/8W film	P type film	U type film	Solid	Oxide film	Metal film	Cement	Fuse
Symbol	None	P	U	S	R	W	W	RF

Tolerance	±2%	±5%	±10%	±20%
Symbol	G	J	None	None

* All film type and oxide film resistors used are ±5%, so the tolerance symbol was not indicated for them.

CAPACITANCE INDICATION

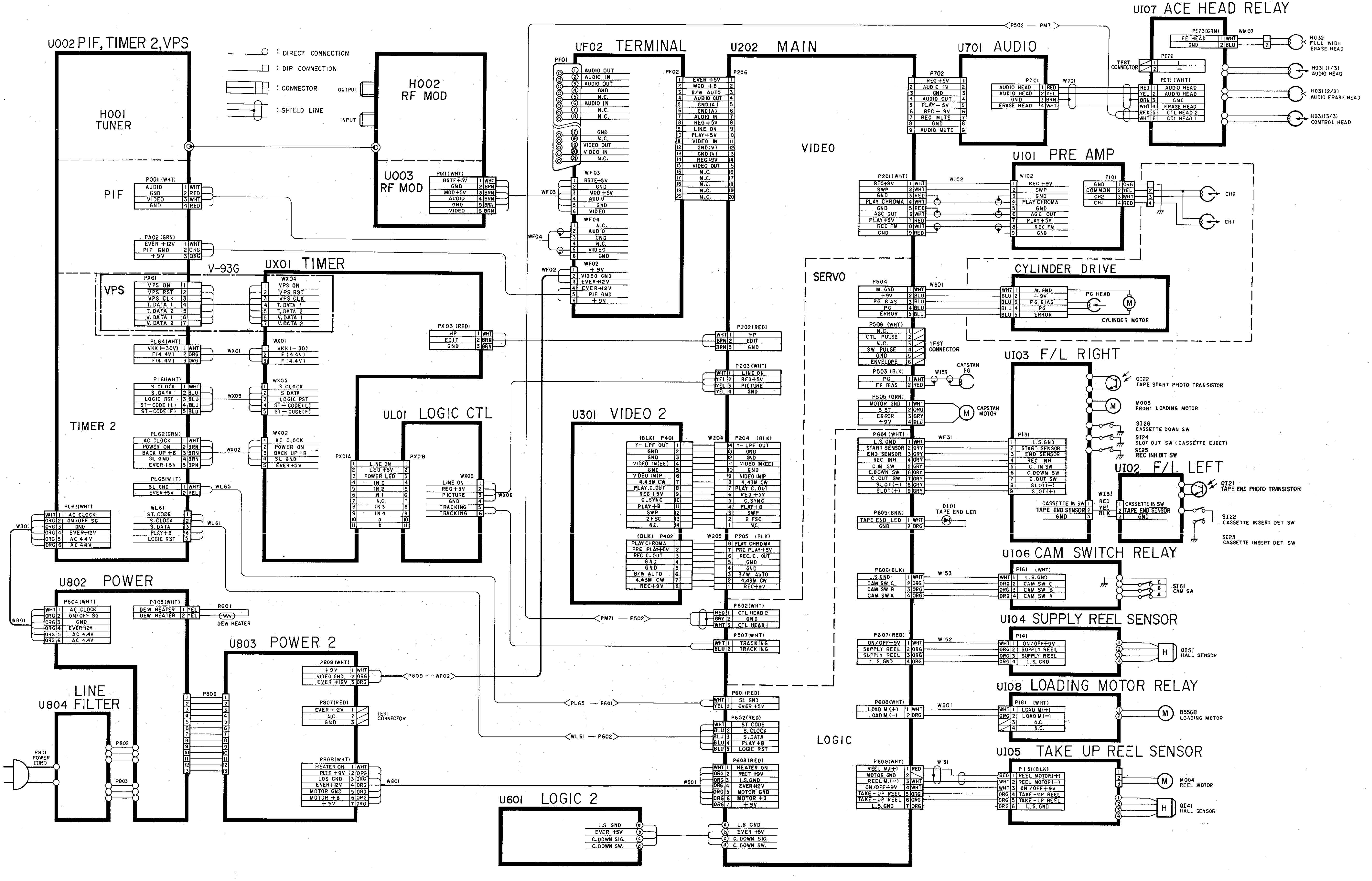
Description	Symbol	Capacitance, unit	Capacitance allowance
Electrolytic		μF	Not indicated
Special electrolytic			Indicated
Plastic film		μF:indicated with numbers below decimal point	Indicated below ±5% (J), indicated below ±0.5pF, not indicated for others
Ceramic		pF:indicated with numbers over decimal point	
Trimmer		pF	Not indicated

Note: No working voltage is indicated for capacitors rated at 50V except electrolytic capacitors.

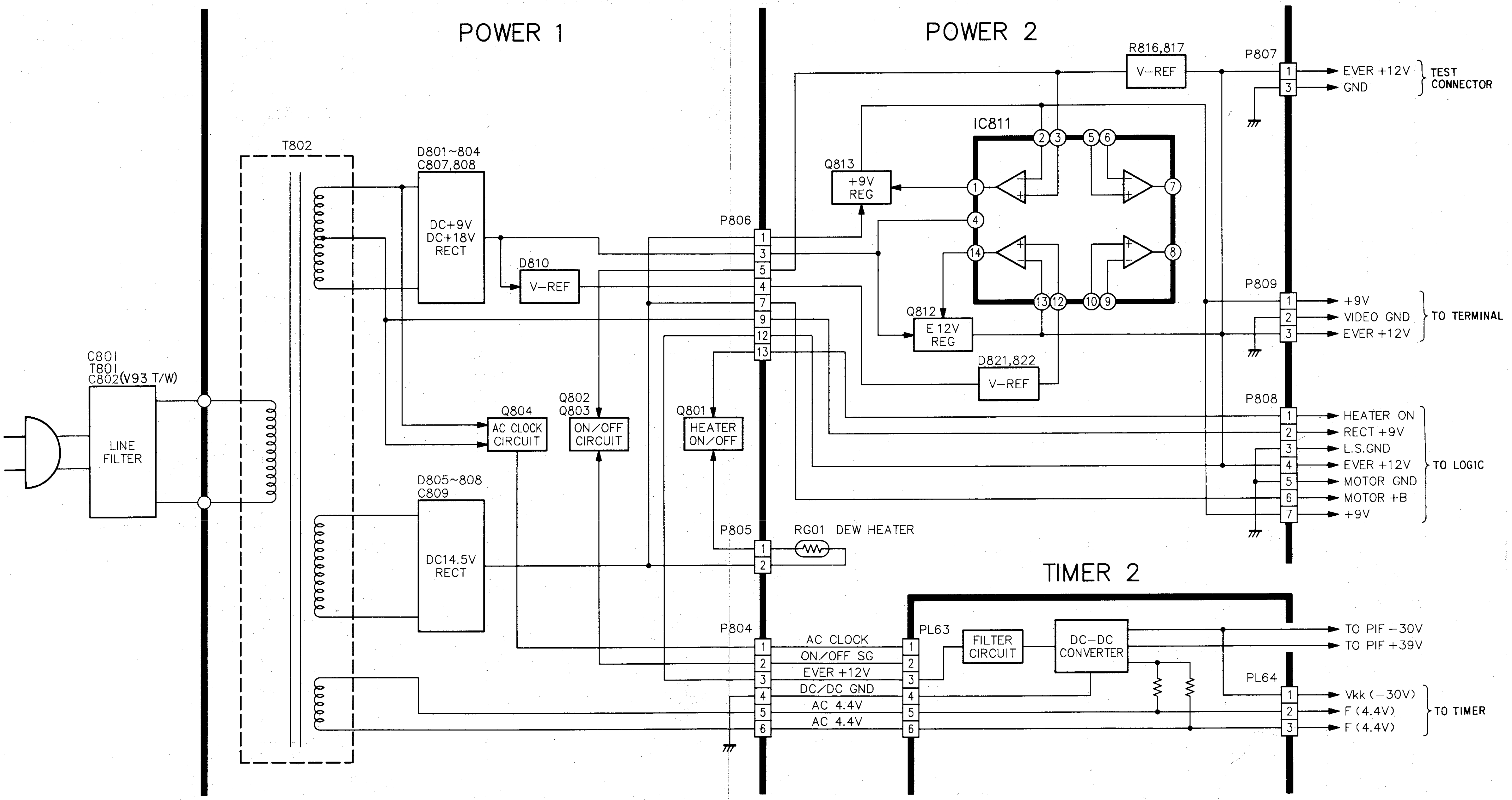
WAVEFORM AND VOLTAGE MEASUREMENT

- * Measurement of waveform and voltage at each section in the color circuits was conducted with sufficient service color bar signal being received and reproduced in normal conditions.
- * Waveforms and voltage values for the remaining circuit were measured with a broadcasting signal normally received, so they may vary slightly according to the programs being received. Use them as a measure for servicing.
- * All voltage values except the waveforms are expressed in DC and measured by a digital voltmeter.

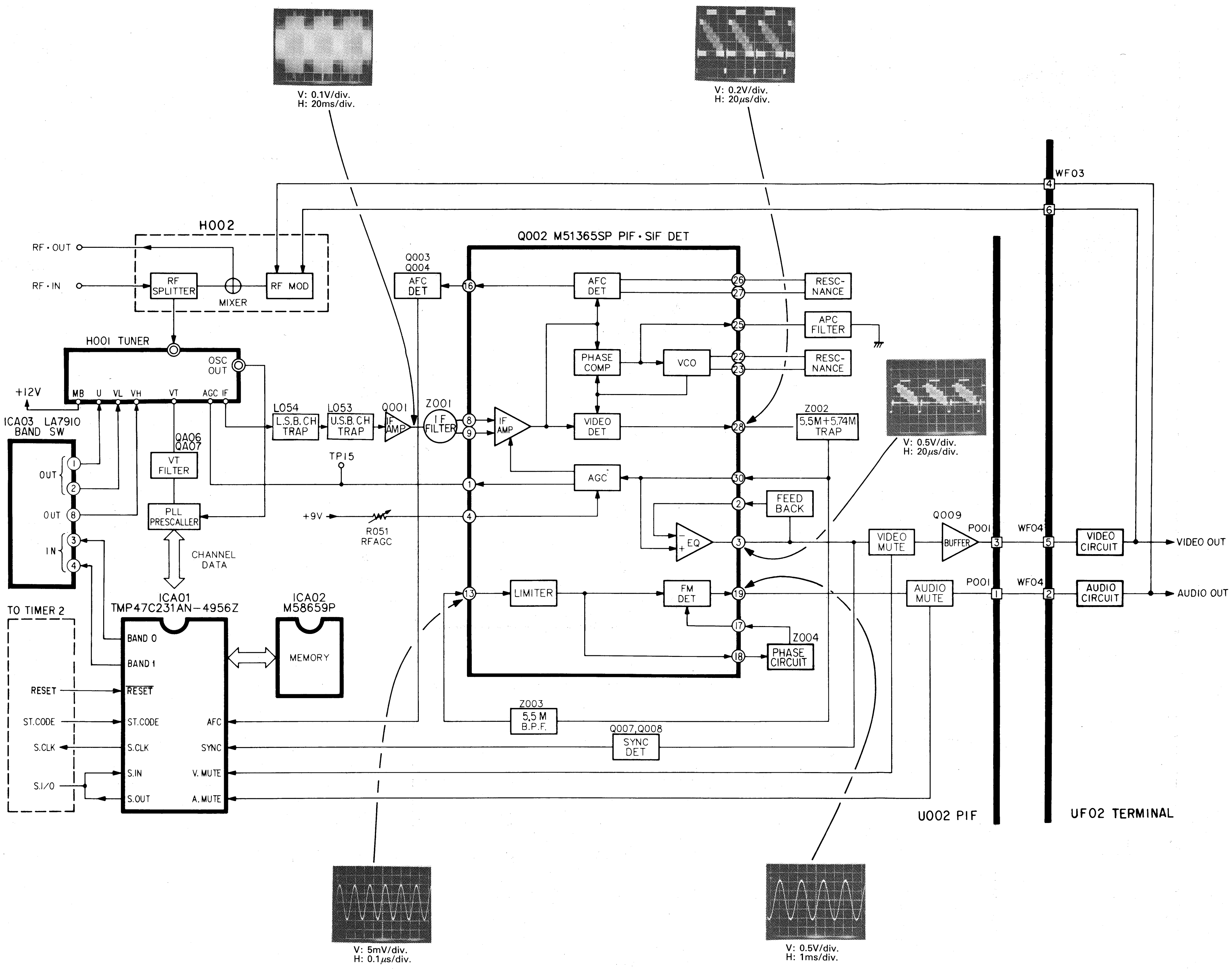
6. Printed Wiring Board and Schematic Diagram


U002 PIF, TIMER 2, VPS
H001 TUNER
PIF
P001 (WHT)
AUDIO
GND
VIDEO
GND
PA02 (GRN)
EVER +12V
PIF GND
+9V
VPS
PX61
VPS ON
VPS RST
VPS CLK
T. DATA 1
T. DATA 2
V. DATA 1
V. DATA 2
V-93G
TIMER 2
PL64 (WHT)
VKK (−30V)
F (4.4V)
F (4.4V)
PL61 (WHT)
S. CLOCK
S. DATA
LOGIC RST
ST−CODE (L)
ST−CODE (F)
PL62 (GRN)
AC CLOCK
POWER ON
BACK UP +B
SL GND
EVER+5V
PL65 (WHT)
SL GND
EVER+5V
WL65
WL61
ST. CODE
S. CLOCK
S. DATA
PLAY+B
LOGIC RST
PL63 (WHT)
AC CLOCK
ON/OFF SG
GND
EVER+12V
AC 4.4V
AC 4.4V
W801
: DIRECT CONNECTION
: DIP CONNECTION
: CONNECTOR
: SHIELD LINE
OUTPUT
INPUT
H002 RF MOD
U003 RF MOD
P011 (WHT)
BSTE+5V
GND
MOD +5V
AUDIO
GND
VIDEO
UX01 TIMER
WX04
WX01
WX05
WX02
PX03 (RED)
HP
EDIT
GND
UL01 LOGIC CTL
PX01A
PX01B
LINE ON
LED +5V
POWER LED
IN 0
IN 2
IN 1
N.C.
IN 3
IN 4
WX06
LINE ON
REG+5V
PICTURE
GND
TRACKING
TRACKING
U802 POWER
P804 (WHT)
P805 (WHT)
DEW HEATER
RG01
DEW HEATER
U803 POWER 2
P806
P809 (WHT)
+9V
VIDEO GND
EVER +12V
P807 (RED)
TEST CONNECTOR
P808 (WHT)
HEATER ON
RECT +9V
LOS GND
EVER+12V
MOTOR GND
MOTOR +B
+9V
U804 LINE FILTER
P801 POWER CORD
P802
P803
UF02 TERMINAL
PF01
PF02
AUDIO OUT
AUDIO IN
VIDEO OUT
VIDEO IN
WF03
WF04
WF02
U202 MAIN
P206
EVER +5V
MOD +B
B/W AUTO
AUDIO OUT
GND (A)
AUDIO IN
REG+5V
LINE ON
PLAY+5V
VIDEO IN
GND (V)
REG+9V
VIDEO OUT
VIDEO
SERVO
LOGIC
P202 (RED)
P203 (WHT)
U301 VIDEO 2
P401 (BLK)
P204 (BLK)
W204
P402 (BLK)
P205 (BLK)
W205
Y−LPF OUT
VIDEO IN (EE)
VIDEO IN (P)
4.43M CW
PLAY C.OUT
C.SYNC
PLAY+B
SWP
2 FSC
PLAY CHROMA
PRE PLAY+5V
REC.C.OUT
B/W AUTO
REC+9V
P502 (WHT)
CTL HEAD 2
CTL HEAD 1
P507 (WHT)
PM71 — P502
P502 — PM71
P809 — WF02
PL65 — P601
WL61 — P602
P601 (RED)
P602 (RED)
P603 (RED)
W801
U601 LOGIC 2
L.S GND
EVER +5V
C.DOWN SIG.
C.DOWN SW.
U701 AUDIO
P702
P701
W701
REG +9V
AUDIO IN
AUDIO OUT
PLAY+ 5V
REC+ 9V
REC MUTE
AUDIO MUTE
AUDIO HEAD
ERASE HEAD
U107 ACE HEAD RELAY
P173 (GRN)
FE HEAD
WM07
P172
TEST CONNECTOR
P171 (WHT)
CTL HEAD 2
CTL HEAD 1
H032 FULL WIDH ERASE HEAD
H031 (1/3) AUDIO HEAD
H031 (2/3) AUDIO ERASE HEAD
H031 (3/3) CONTROL HEAD
U101 PRE AMP
P201 (WHT)
W102
P101
REC+9V
SWP
PLAY CHROMA
AGC OUT
PLAY+5V
REC FM
COMMON
CH2
CH1
CYLINDER DRIVE
P504
W801
M.GND
PG BIAS
PG
ERROR
PG HEAD
CYLINDER MOTOR
P506 (WHT)
CTL PULSE
SW PULSE
ENVELOPE
TEST CONNECTOR
P503 (BLK)
FG BIAS
W153
CAPSTAN FG
P505 (GRN)
MOTOR GND
3 ST
CAPSTAN MOTOR
P604 (WHT)
WF31
L.S. GND
START SENSOR
END SENSOR
REC INH
C.IN SW
C.DOWN SW
C.OUT SW
SLOT (−)
SLOT (+)
P605 (GRN)
TAPE END LED
D101 TAPE END LED
U103 F/L RIGHT
P131
Q122 TAPE START PHOTO TRANSISTOR
M005 FRONT LOADING MOTOR
S126 CASSETTE DOWN SW
S124 SLOT OUT SW (CASSETTE EJECT)
S125 REC INHIBIT SW
U102 F/L LEFT
W131
CASSETTE IN SW
TAPE END SENSOR
Q121 TAPE END PHOTO TRANSISTOR
S122 CASSETTE INSERT DET SW
S123 CASSETTE INSERT DET SW
U106 CAM SWITCH RELAY
P606 (BLK)
W153
P161 (WHT)
CAM SW C
CAM SW B
CAM SW A
S161 CAM SW
U104 SUPPLY REEL SENSOR
P607 (RED)
W152
P141
ON/OFF+9V
SUPPLY REEL
Q151 HALL SENSOR
U108 LOADING MOTOR RELAY
P608 (WHT)
W801
P181 (WHT)
LOAD M (+)
LOAD M (−)
B556B LOADING MOTOR
U105 TAKE UP REEL SENSOR
P609 (WHT)
W151
P151 (BLK)
REEL MOTOR (+)
REEL MOTOR (−)
ON/OFF+9V
TAKE−UP REEL
M004 REEL MOTOR
Q141 HALL SENSOR

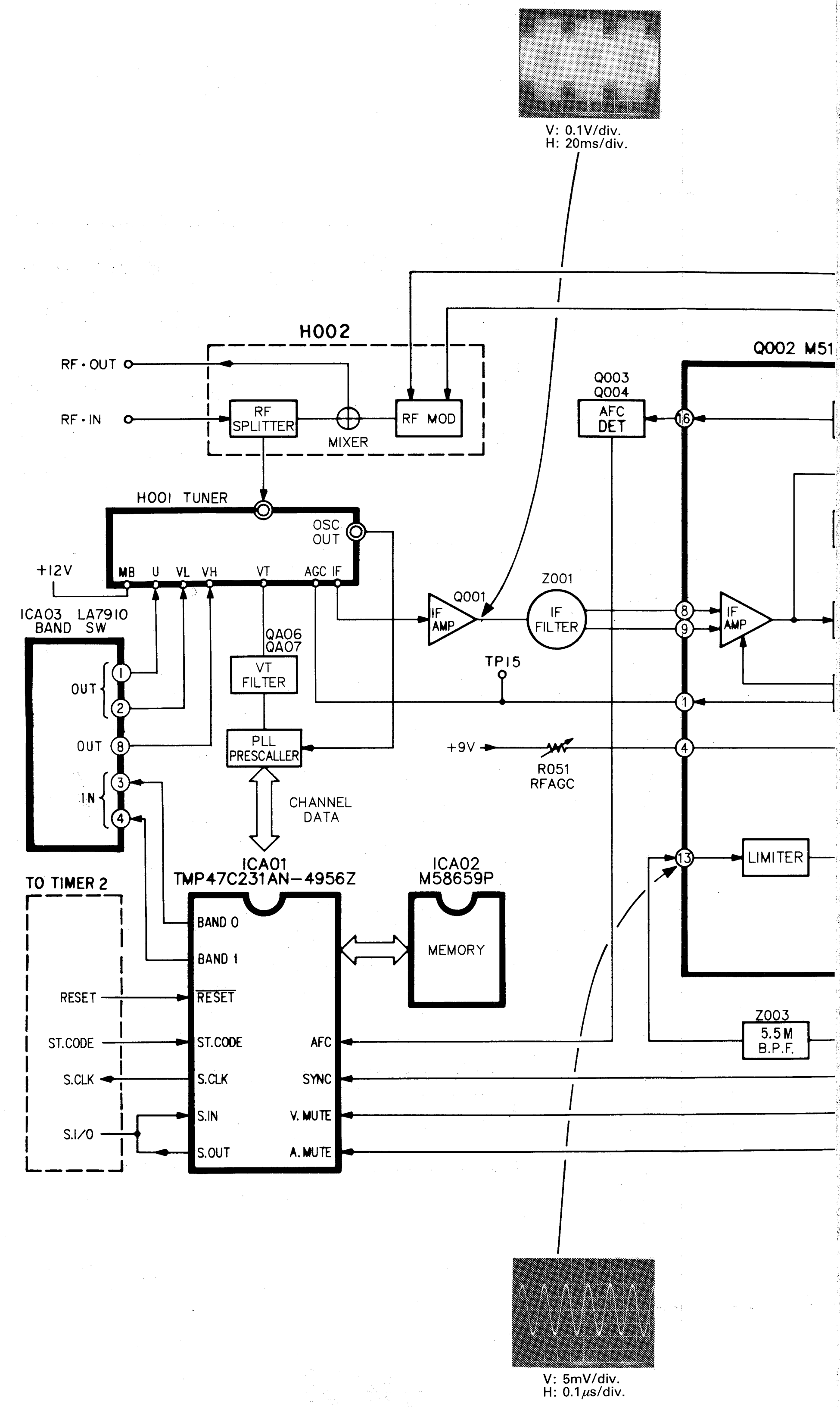
7-1. Power Supply Block Diagram

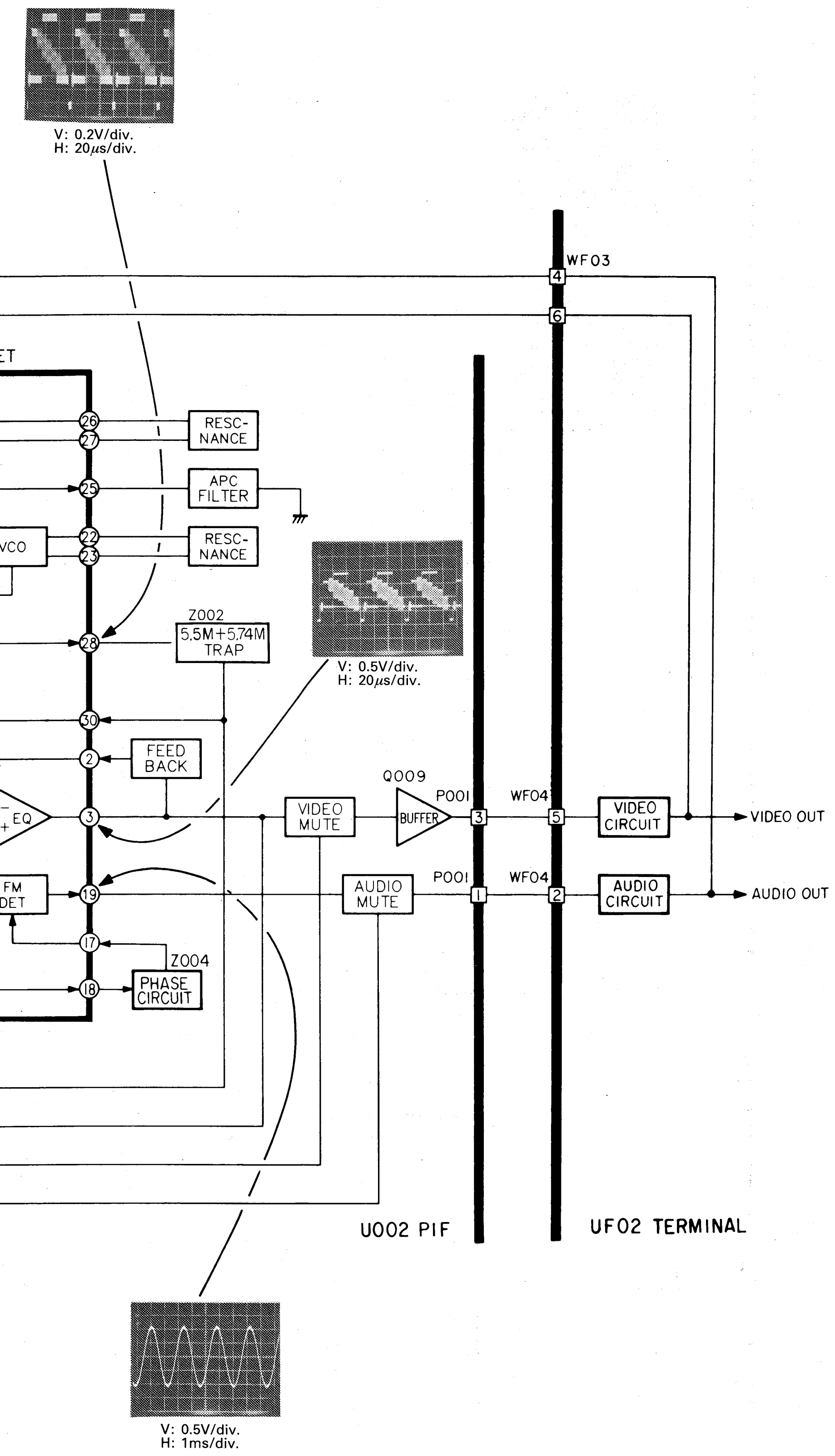

POWER 1
POWER 2
TIMER 2
C801
T801
C802(V93 T/W)
LINE FILTER
T802
D801~804
C807,808
DC+9V
DC+18V
RECT
D810
V–REF
D805~808
C809
DC14.5V
RECT
Q804
AC CLOCK CIRCUIT
Q802
Q803
ON/OFF CIRCUIT
Q801
HEATER ON/OFF
P806
1
3
5
4
7
9
12
13
P805
1
2
RG01 DEW HEATER
P804
1
2
3
4
5
6
AC CLOCK
ON/OFF SG
EVER +12V
DC/DC GND
AC 4.4V
AC 4.4V
PL63
1
2
3
4
5
6
FILTER CIRCUIT
DC–DC CONVERTER
R816,817
V–REF
Q813
+9V REG
IC811
1
2
3
4
5
6
7
8
9
10
12
13
14
Q812
E 12V REG
D821,822
V–REF
P807
1
3
EVER +12V
GND
TEST CONNECTOR
P809
1
2
3
+9V
VIDEO GND
EVER +12V
TO TERMINAL
P808
1
2
3
4
5
6
7
HEATER ON
RECT +9V
L.S.GND
EVER +12V
MOTOR GND
MOTOR +B
+9V
TO LOGIC
TO PIF –30V
TO PIF +39V
PL64
1
2
3
Vkk (–30V)
F (4.4V)
F (4.4V)
TO TIMER

8-1. PIF, Selector Block Diagram (V-93G/T)

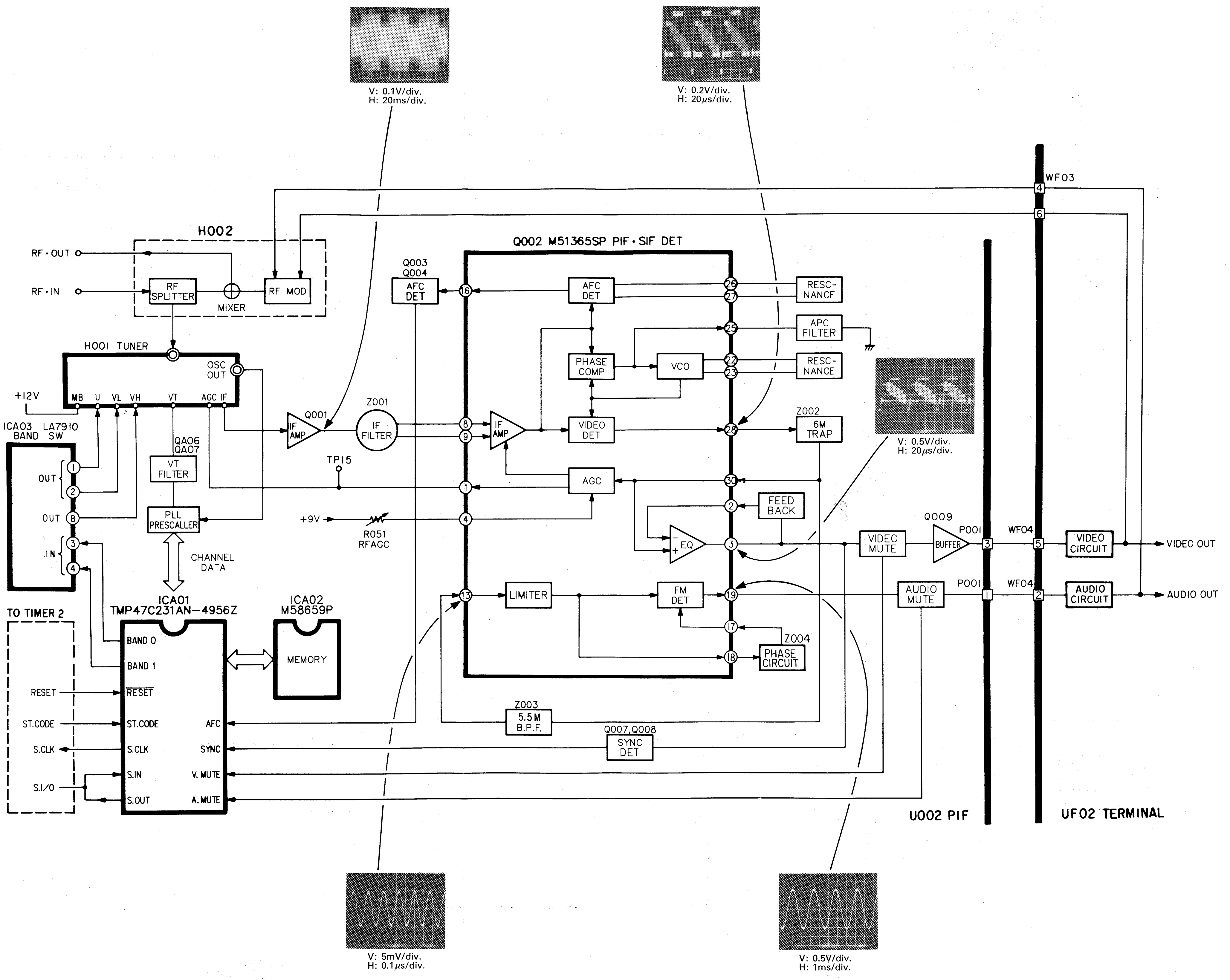

V: 0.1V/div.
H: 20ms/div.
V: 0.2V/div.
H: 20μs/div.
V: 0.5V/div.
H: 20μs/div.
V: 5mV/div.
H: 0.1μs/div.
V: 0.5V/div.
H: 1ms/div.
H002
RF・OUT
RF・IN
RF SPLITTER
MIXER
RF MOD
H001 TUNER
OSC OUT
+12V
MB U VL VH VT AGC IF
ICA03 LA7910
BAND SW
OUT
IN
QA06
QA07
VT FILTER
PLL PRESCALLER
CHANNEL DATA
TO TIMER 2
RESET
ST.CODE
S.CLK
S.I/O
ICA01
TMP47C231AN-4956Z
BAND 0
BAND 1
RESET
ST.CODE
S.CLK
S.IN
S.OUT
AFC
SYNC
V. MUTE
A. MUTE
ICA02
M58659P
MEMORY
L054
L.S.B.CH TRAP
L053
U.S.B.CH TRAP
Q001
IF AMP
Z001
IF FILTER
TP15
+9V
R051
RFAGC
Q003
Q004
AFC DET
Q002 M51365SP PIF・SIF DET
AFC DET
PHASE COMP
VCO
IF AMP
VIDEO DET
AGC
EQ
LIMITER
FM DET
RESC-NANCE
APC FILTER
RESC-NANCE
Z002
5.5M+5.74M TRAP
FEED BACK
Z004
PHASE CIRCUIT
Z003
5.5M B.P.F.
Q007,Q008
SYNC DET
VIDEO MUTE
AUDIO MUTE
Q009
BUFFER
P001
WF04
WF03
VIDEO CIRCUIT
AUDIO CIRCUIT
VIDEO OUT
AUDIO OUT
U002 PIF
UF02 TERMINAL

8-2. PIF, Selector Block Diagram (V-93W)

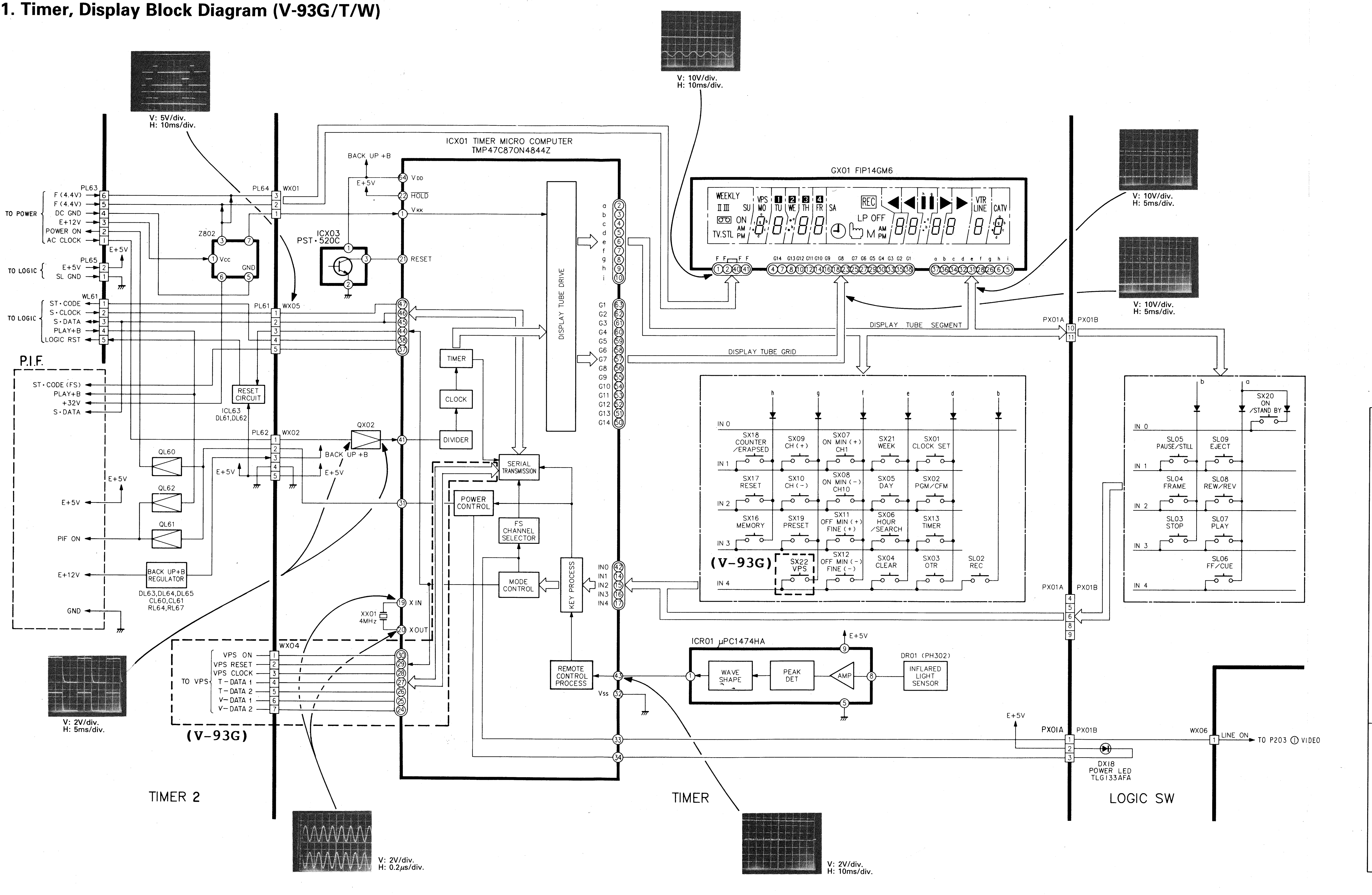

V: 0.1V/div.
H: 20ms/div.
V: 5mV/div.
H: 0.1μs/div.
H002
RF・OUT
RF・IN
RF SPLITTER
MIXER
RF MOD
H001 TUNER
OSC OUT
+12V
MB U VL VH VT AGC IF
ICA03 LA7910
BAND SW
OUT
IN
QA06
QA07
VT FILTER
PLL PRESCALLER
CHANNEL DATA
TO TIMER 2
RESET
ST.CODE
S.CLK
S.I/O
ICA01
TMP47C231AN-4956Z
BAND 0
BAND 1
RESET
ST.CODE
S.CLK
S.IN
S.OUT
AFC
SYNC
V. MUTE
A. MUTE
ICA02
M58659P
MEMORY
Q001
IF AMP
Z001
IF FILTER
TP15
+9V
R051
RFAGC
Q003
Q004
AFC DET
Q002 M51
IF AMP
LIMITER
Z003
5.5M B.P.F.

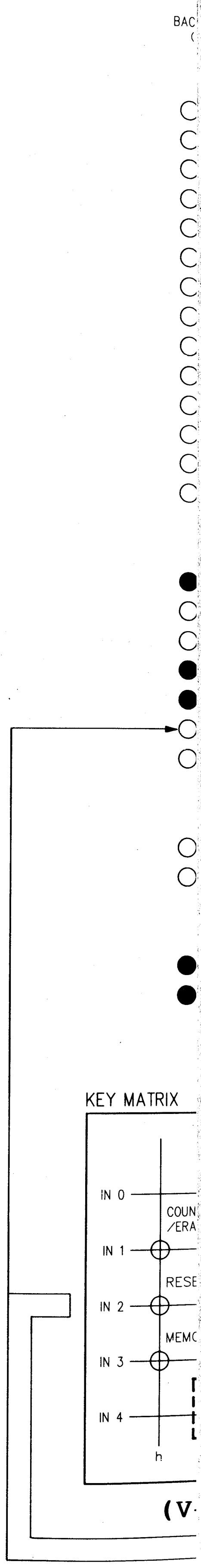

V: 0.2V/div.
H: 20μs/div.
WF03
4
6
RESC-NANCE
APC FILTER
VCO
RESC-NANCE
26
27
25
22
23
Z002
5.5M+5.74M TRAP
28
V: 0.5V/div.
H: 20μs/div.
30
2
FEED BACK
EQ
3
FM DET
19
17
Z004
PHASE CIRCUIT
18
VIDEO MUTE
Q009
BUFFER
P001
3
WF04
5
VIDEO CIRCUIT
VIDEO OUT
AUDIO MUTE
P001
1
WF04
2
AUDIO CIRCUIT
AUDIO OUT
U002 PIF
UF02 TERMINAL
V: 0.5V/div.
H: 1ms/div.

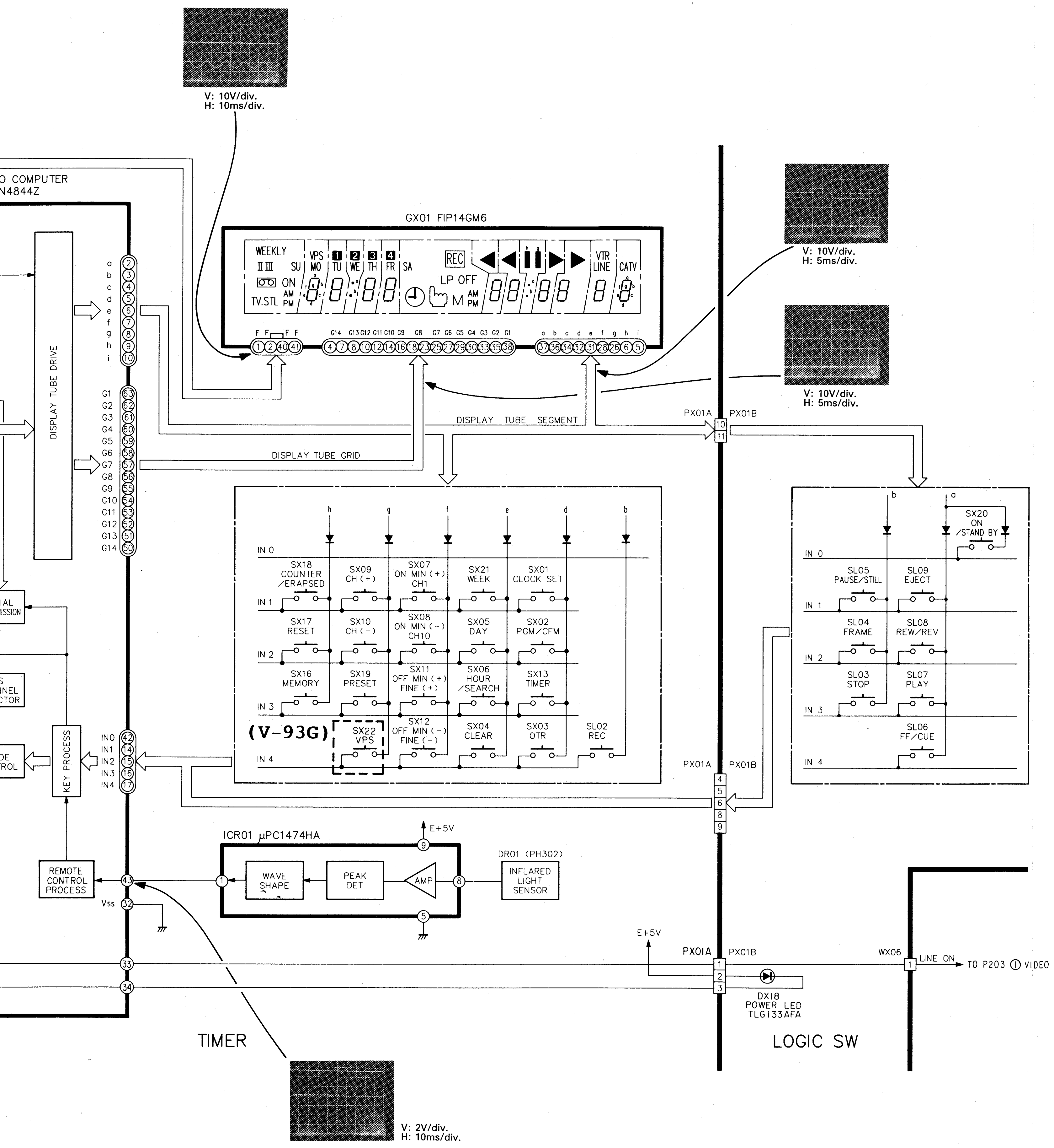
8-2. PIF, Selector Block Diagram (V-93W)

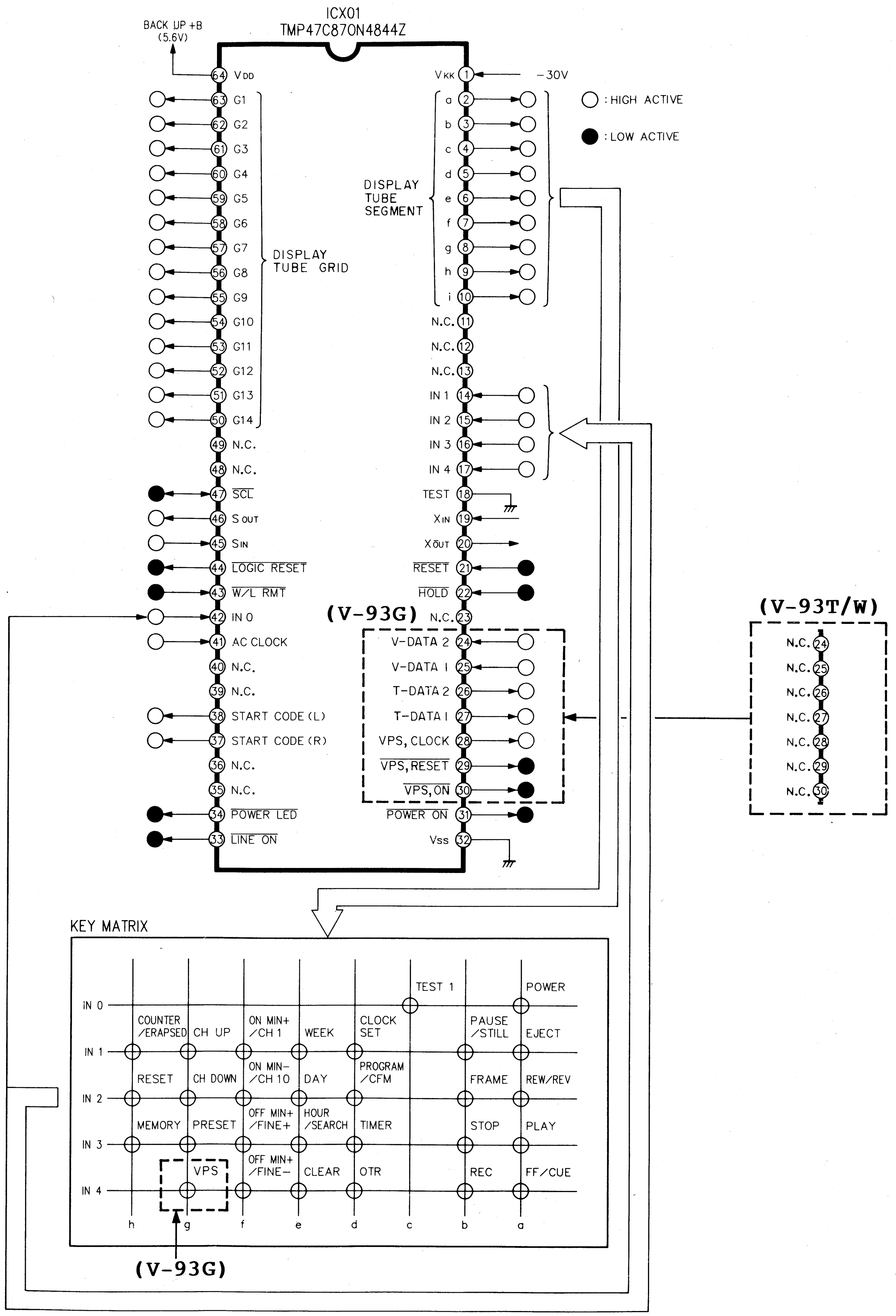

V: 0.1V/div.
H: 20ms/div.
V: 0.2V/div.
H: 20μs/div.
WF03
4
6
H002
RF・OUT
RF・IN
RF SPLITTER
MIXER
RF MOD
H001 TUNER
OSC OUT
MB U VL VH VT AGC IF
+12V
ICA03 LA7910
BAND SW
OUT
1
2
OUT
8
IN
3
4
QA06
QA07
VT FILTER
PLL PRESCALLER
CHANNEL DATA
Q001
IF AMP
Z001
IF FILTER
TP15
+9V
R051
RFAGC
Q003
Q004
AFC DET
Q002 M51365SP PIF・SIF DET
16
AFC DET
PHASE COMP
VCO
VIDEO DET
AGC
IF AMP
8
9
1
4
EQ
LIMITER
13
FM DET
26
27
25
22
23
28
30
2
3
19
17
18
RESC-NANCE
APC FILTER
RESC-NANCE
Z002
6M TRAP
V: 0.5V/div.
H: 20μs/div.
FEED BACK
Z004
PHASE CIRCUIT
Q009
BUFFER
P001
3
WF04
5
VIDEO MUTE
VIDEO CIRCUIT
VIDEO OUT
AUDIO MUTE
P001
1
WF04
2
AUDIO CIRCUIT
AUDIO OUT
Z003
5.5M B.P.F.
Q007,Q008
SYNC DET
TO TIMER 2
RESET
ST.CODE
S.CLK
S.I/O
ICA01
TMP47C231AN-4956Z
BAND 0
BAND 1
RESET
ST.CODE
S.CLK
S.IN
S.OUT
AFC
SYNC
V. MUTE
A. MUTE
ICA02
M58659P
MEMORY
U002 PIF
UF02 TERMINAL
V: 5mV/div.
H: 0.1μs/div.
V: 0.5V/div.
H: 1ms/div.

9-1. Timer, Display Block Diagram (V-93G/T/W)

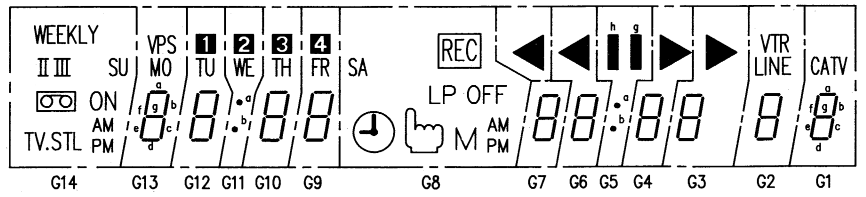

V: 5V/div.
H: 10ms/div.
V: 10V/div.
H: 10ms/div.
V: 10V/div.
H: 5ms/div.
V: 10V/div.
H: 5ms/div.
V: 2V/div.
H: 5ms/div.
V: 2V/div.
H: 0.2μs/div.
V: 2V/div.
H: 10ms/div.
ICX01 TIMER MICRO COMPUTER
TMP47C870N4844Z
BACK UP +B
E+5V
VDD
HOLD
VKK
RESET
ICX03
PST・520C
Z802
Vcc
GND
PL63
F (4.4V)
F (4.4V)
DC GND
E+12V
POWER ON
AC CLOCK
TO POWER
PL64
WX01
PL65
TO LOGIC
E+5V
SL GND
WL61
ST・CODE
S・CLOCK
S・DATA
PLAY+B
LOGIC RST
PL61
WX05
P.I.F.
ST・CODE (FS)
PLAY+B
+32V
S・DATA
E+5V
PIF ON
E+12V
GND
RESET CIRCUIT
ICL63
DL61,DL62
PL62
WX02
QL60
QL62
QL61
QX02
BACK UP +B
BACK UP+B REGULATOR
DL63,DL64,DL65
CL60,CL61
RL64,RL67
XX01
4MHz
X IN
X OUT
WX04
TO VPS
VPS ON
VPS RESET
VPS CLOCK
T-DATA 1
T-DATA 2
V-DATA 1
V-DATA 2
(V-93G)
TIMER
CLOCK
DIVIDER
SERIAL TRANSMISSION
POWER CONTROL
FS CHANNEL SELECTOR
MODE CONTROL
KEY PROCESS
REMOTE CONTROL PROCESS
DISPLAY TUBE DRIVE
a b c d e f g h i
G1 G2 G3 G4 G5 G6 G7 G8 G9 G10 G11 G12 G13 G14
IN0 IN1 IN2 IN3 IN4
Vss
GX01 FIP14GM6
WEEKLY VPS 1 2 3 4 SU MO TU WE TH FR SA ON AM PM TV.STL REC LP OFF M VTR LINE CATV
DISPLAY TUBE SEGMENT
DISPLAY TUBE GRID
IN 0
IN 1
IN 2
IN 3
IN 4
SX18 COUNTER /ERAPSED
SX09 CH (+)
SX07 ON MIN (+) CH1
SX21 WEEK
SX01 CLOCK SET
SX17 RESET
SX10 CH (-)
SX08 ON MIN (-) CH10
SX05 DAY
SX02 PGM/CFM
SX16 MEMORY
SX19 PRESET
SX11 OFF MIN (+) FINE (+)
SX06 HOUR /SEARCH
SX13 TIMER
(V-93G)
SX22 VPS
SX12 OFF MIN (-) FINE (-)
SX04 CLEAR
SX03 OTR
SL02 REC
ICR01 μPC1474HA
E+5V
WAVE SHAPE
PEAK DET
AMP
DR01 (PH302)
INFLARED LIGHT SENSOR
PX01A
PX01B
SX20 ON /STAND BY
SL05 PAUSE/STILL
SL09 EJECT
SL04 FRAME
SL08 REW/REV
SL03 STOP
SL07 PLAY
SL06 FF/CUE
E+5V
WX06
LINE ON
TO P203 ① VIDEO
DX18
POWER LED
TLG133AFA
TIMER 2
TIMER
LOGIC SW


KEY MATRIX
IN 0
IN 1
IN 2
IN 3
IN 4
RESE
MEMO
h


V: 10V/div.
H: 10ms/div.
O COMPUTER
N4844Z
GX01 FIP14GM6
WEEKLY
II III SU MO TU WE TH FR SA
VPS 1 2 3 4
REC
LP OFF
VTR LINE
CATV
ON AM PM
TV.STL
M AM PM
F F F F
G14 G13 G12 G11 G10 G9 G8 G7 G6 G5 G4 G3 G2 G1
a b c d e f g h i
V: 10V/div.
H: 5ms/div.
V: 10V/div.
H: 5ms/div.
DISPLAY TUBE DRIVE
a b c d e f g h i
G1 G2 G3 G4 G5 G6 G7 G8 G9 G10 G11 G12 G13 G14
DISPLAY TUBE SEGMENT
DISPLAY TUBE GRID
PX01A PX01B
IN 0
SX18 COUNTER /ERAPSED
SX09 CH (+)
SX07 ON MIN (+) CH1
SX21 WEEK
SX01 CLOCK SET
IN 1
SX17 RESET
SX10 CH (-)
SX08 ON MIN (-) CH10
SX05 DAY
SX02 PGM/CFM
IN 2
SX16 MEMORY
SX19 PRESET
SX11 OFF MIN (+) FINE (+)
SX06 HOUR /SEARCH
SX13 TIMER
IN 3
(V-93G)
SX22 VPS
SX12 OFF MIN (-) FINE (-)
SX04 CLEAR
SX03 OTR
SL02 REC
IN 4
SX20 ON /STAND BY
SL05 PAUSE/STILL
SL09 EJECT
SL04 FRAME
SL08 REW/REV
SL03 STOP
SL07 PLAY
SL06 FF/CUE
IAL
IISSION
S
INEL
CTOR
DE
ROL
KEY PROCESS
IN0 IN1 IN2 IN3 IN4
REMOTE CONTROL PROCESS
Vss
ICR01 μPC1474HA
E+5V
WAVE SHAPE
PEAK DET
AMP
DR01 (PH302)
INFLARED LIGHT SENSOR
E+5V
WX06
LINE ON
TO P203 ① VIDEO
DX18 POWER LED TLG133AFA
TIMER
LOGIC SW
V: 2V/div.
H: 10ms/div.

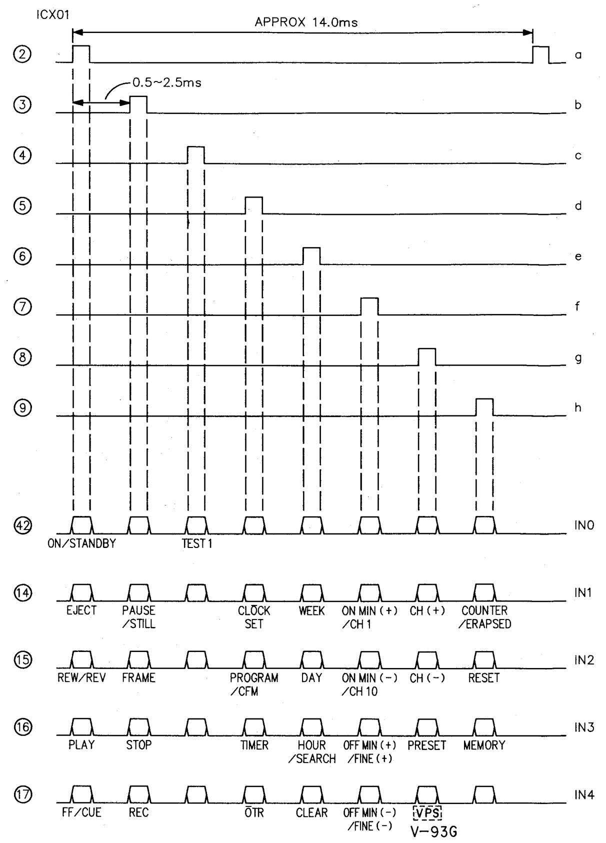

ICX01
TMP47C870N4844Z
BACK UP +B (5.6V)
-30V
○ : HIGH ACTIVE
● : LOW ACTIVE
64 VDD
63 G1
62 G2
61 G3
60 G4
59 G5
58 G6
57 G7
56 G8
55 G9
54 G10
53 G11
52 G12
51 G13
50 G14
DISPLAY TUBE GRID
49 N.C.
48 N.C.
47 SCL
46 SOUT
45 SIN
44 LOGIC RESET
43 W/L RMT
42 IN 0
41 AC CLOCK
40 N.C.
39 N.C.
38 START CODE (L)
37 START CODE (R)
36 N.C.
35 N.C.
34 POWER LED
33 LINE ON
VKK 1
a 2
b 3
c 4
d 5
e 6
f 7
g 8
h 9
i 10
DISPLAY TUBE SEGMENT
N.C. 11
N.C. 12
N.C. 13
IN 1 14
IN 2 15
IN 3 16
IN 4 17
TEST 18
XIN 19
XOUT 20
RESET 21
HOLD 22
(V-93G)
N.C. 23
V-DATA 2 24
V-DATA 1 25
T-DATA 2 26
T-DATA 1 27
VPS, CLOCK 28
VPS, RESET 29
VPS, ON 30
POWER ON 31
Vss 32
(V-93T/W)
N.C. 24
N.C. 25
N.C. 26
N.C. 27
N.C. 28
N.C. 29
N.C. 30
KEY MATRIX
IN 0
IN 1
IN 2
IN 3
IN 4
TEST 1
POWER
COUNTER /ERAPSED
CH UP
ON MIN+ /CH 1
WEEK
CLOCK SET
PAUSE /STILL
EJECT
RESET
CH DOWN
ON MIN- /CH 10
DAY
PROGRAM /CFM
FRAME
REW/REV
MEMORY
PRESET
OFF MIN+ /FINE+
HOUR /SEARCH
TIMER
STOP
PLAY
VPS
OFF MIN+ /FINE-
CLEAR
OTR
REC
FF/CUE
h g f e d c b a
(V-93G)

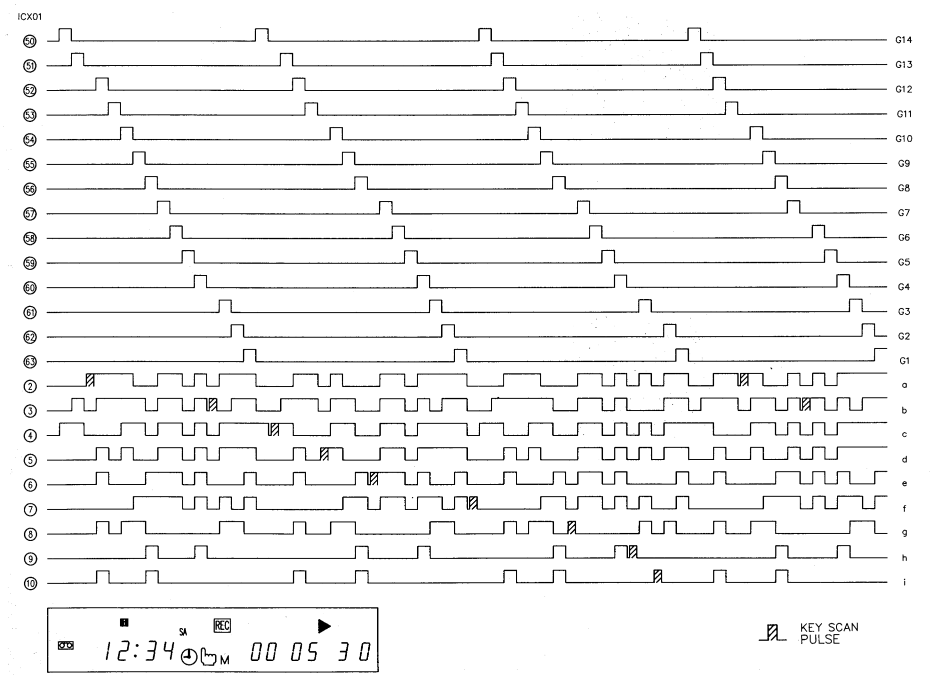
GX01 FIP14GM6


WEEKLY
VPS
1 2 3 4
REC
VTR
LINE
CATV
II III
SU MO TU WE TH FR SA
ON
LP OFF
TV.STL
AM PM
M
AM PM
G14 G13 G12 G11 G10 G9 G8 G7 G6 G5 G4 G3 G2 G1

Display Pattern

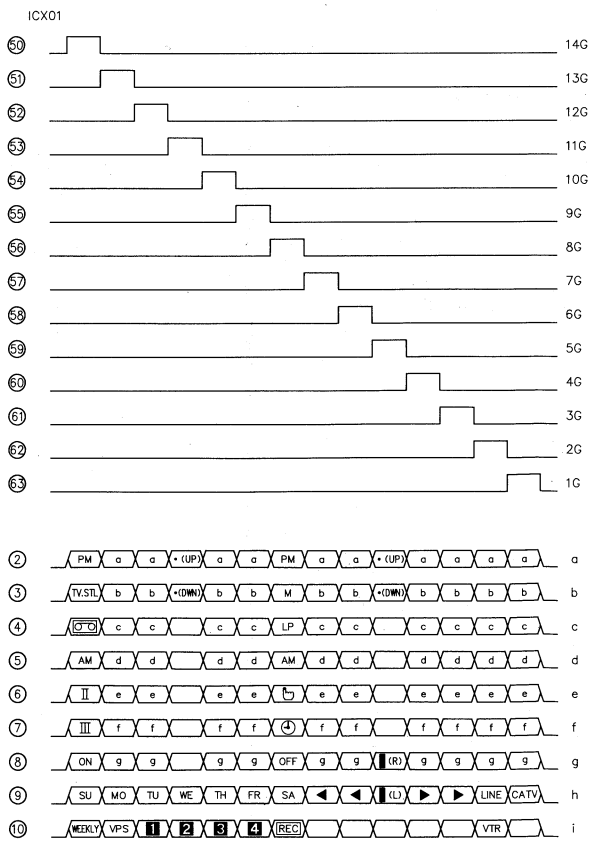
SEGMENT \ GRID	14G	13G	12G	11G	10G	9G	8G	7G	6G	5G	4G	3G	2G	1G
a	PM	a	a	•(UP)	a	a	PM	a	a	•(UP)	a	a	a	a
b	TV.STL	b	b	•(DOWN)	b	b	M	b	b	•(DOWN)	b	b	b	b
c	▭	c	c		c	c	LP	c	c		c	c	c	c
d	AM	d	d		d	d	AM	d	d		d	d	d	d
e	II	e	e		e	e	☝	e	e		e	e	e	e
f	III	f	f		f	f	◷	f	f		f	f	f	f
g	ON	g	g		g	g	OFF	g	g	▮(R)	g	g	g	g
h	SU	MO	TU	WE	TH	FR	SA	◀	◀	▮(L)	▶	▶	LINE	CATV
i	WEEKLY	VPS	❶	❷	❸	❹	REC						VTR	



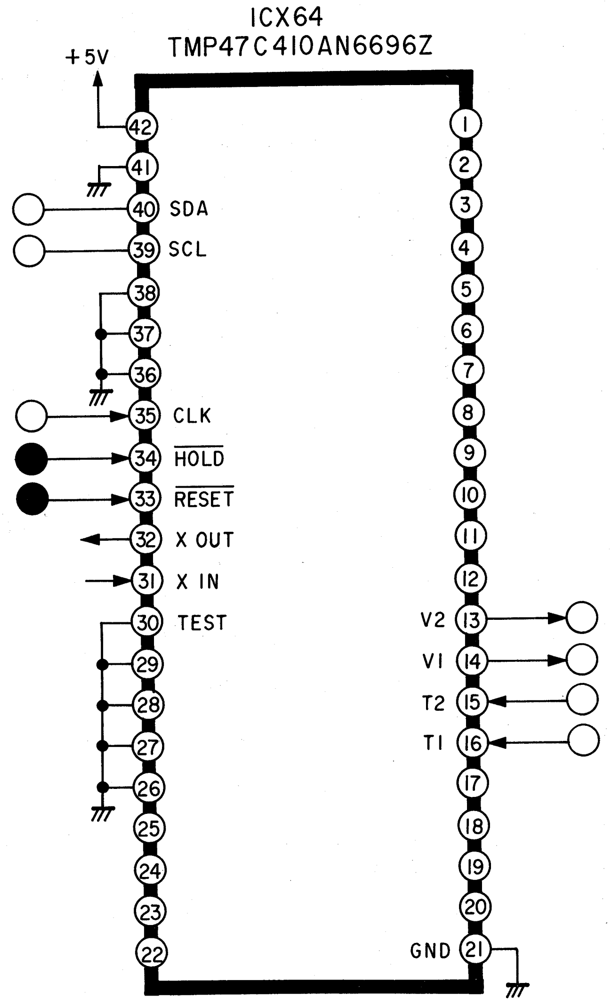


Display tube timing chart (EX. 12:34 30ch)

K Stands for output for key scanning and is developede at every two grid outputs.

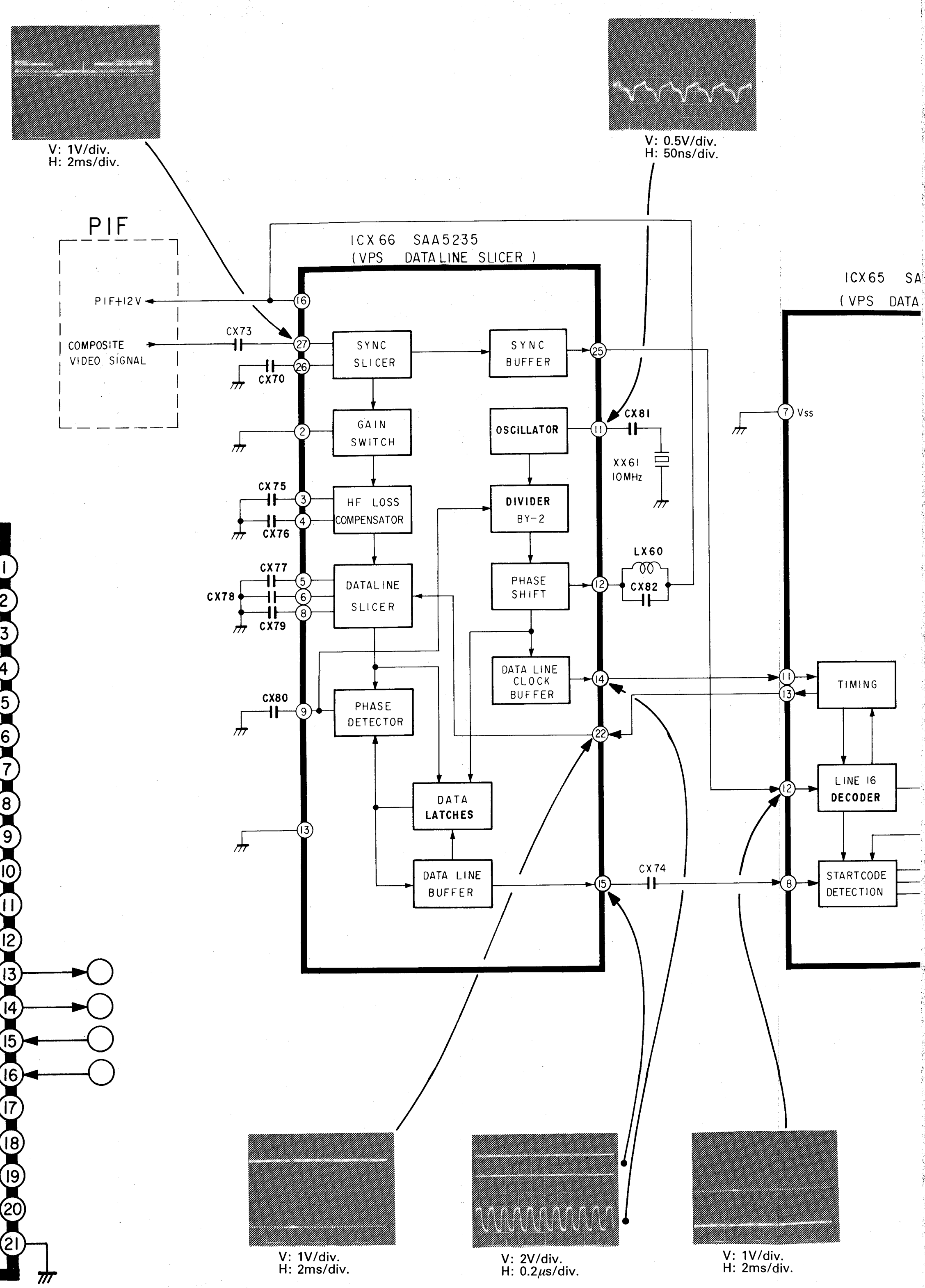


9-6. VPS Block Diagram

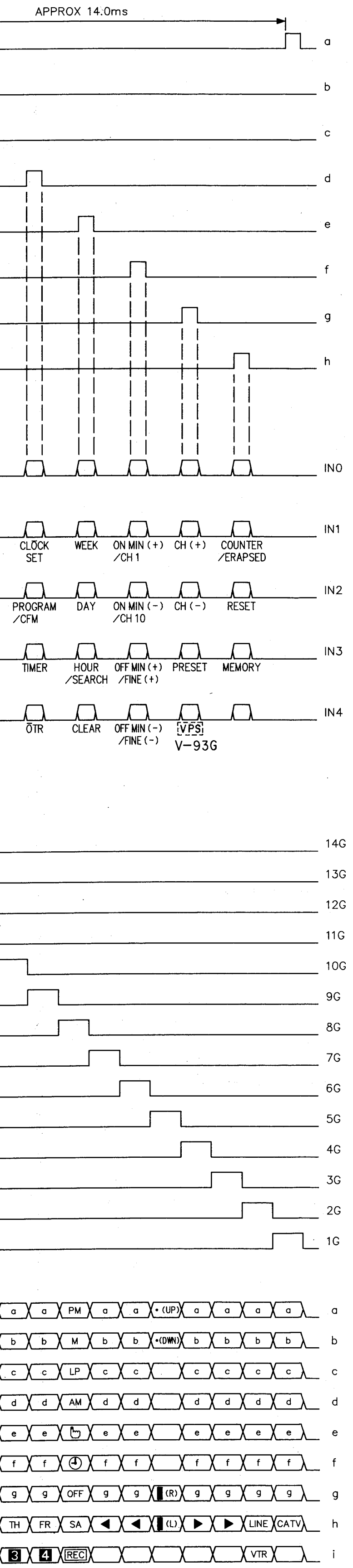

ICX64
TMP47C410AN6696Z
+5V
SDA
SCL
CLK
HOLD
RESET
X OUT
X IN
TEST
V2
V1
T2
T1
GND
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21
22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42

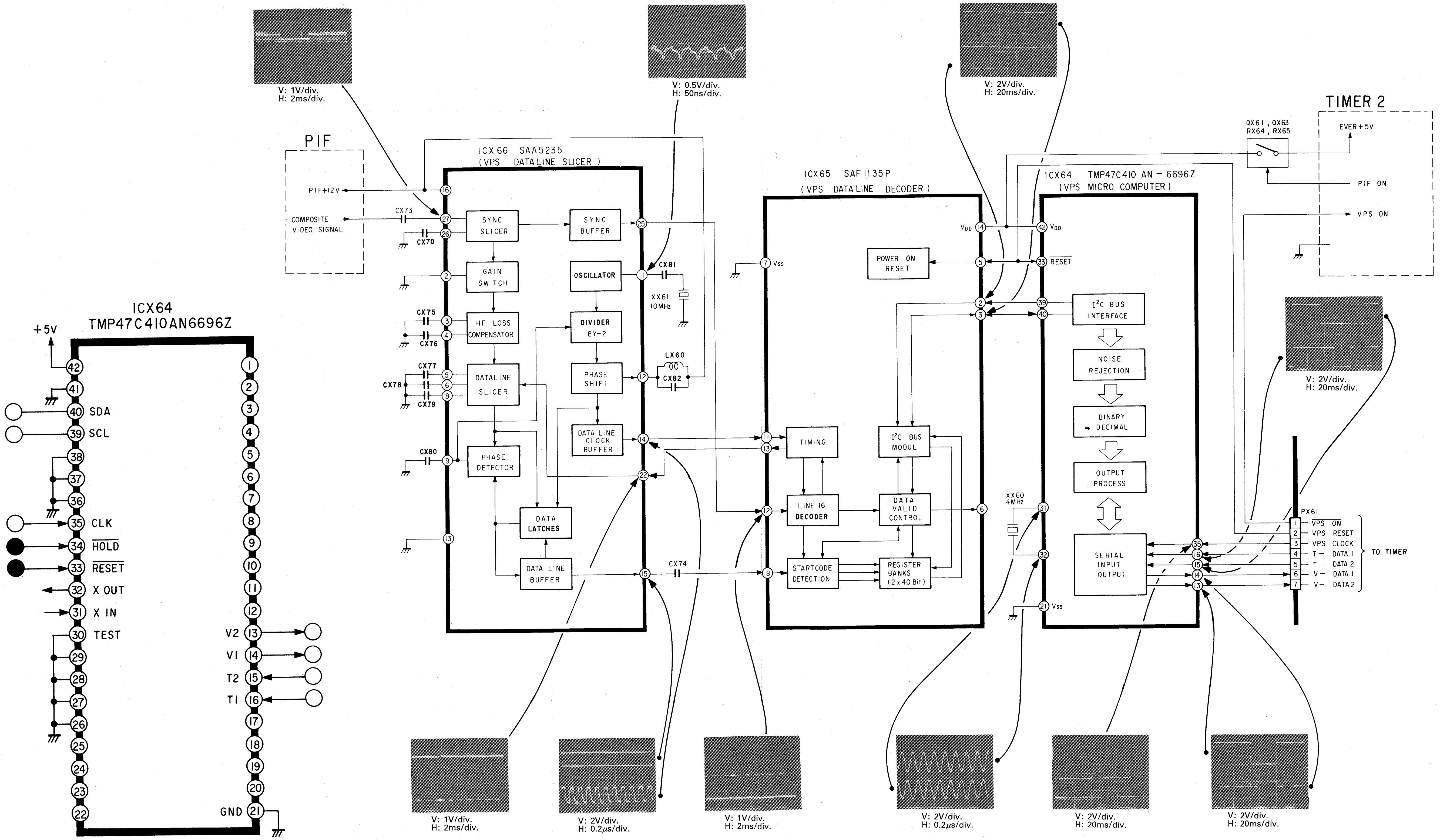
○: HIGH ACTIVE

●: LOW ACTIVE


V: 1V/div.
H: 2ms/div.
V: 0.5V/div.
H: 50ns/div.
PIF
PIF+12V
COMPOSITE VIDEO SIGNAL
ICX66 SAA5235
(VPS DATALINE SLICER)
CX73
CX70
SYNC SLICER
SYNC BUFFER
GAIN SWITCH
OSCILLATOR
CX81
XX61 10MHz
HF LOSS COMPENSATOR
DIVIDER BY-2
CX75
CX76
CX77
CX78
CX79
DATALINE SLICER
PHASE SHIFT
LX60
CX82
DATA LINE CLOCK BUFFER
CX80
PHASE DETECTOR
DATA LATCHES
DATA LINE BUFFER
CX74
ICX65 SA
(VPS DATA
Vss
TIMING
LINE 16 DECODER
STARTCODE DETECTION
V: 1V/div.
H: 2ms/div.
V: 2V/div.
H: 0.2μs/div.
V: 1V/div.
H: 2ms/div.

9-6. VPS Block Diagram

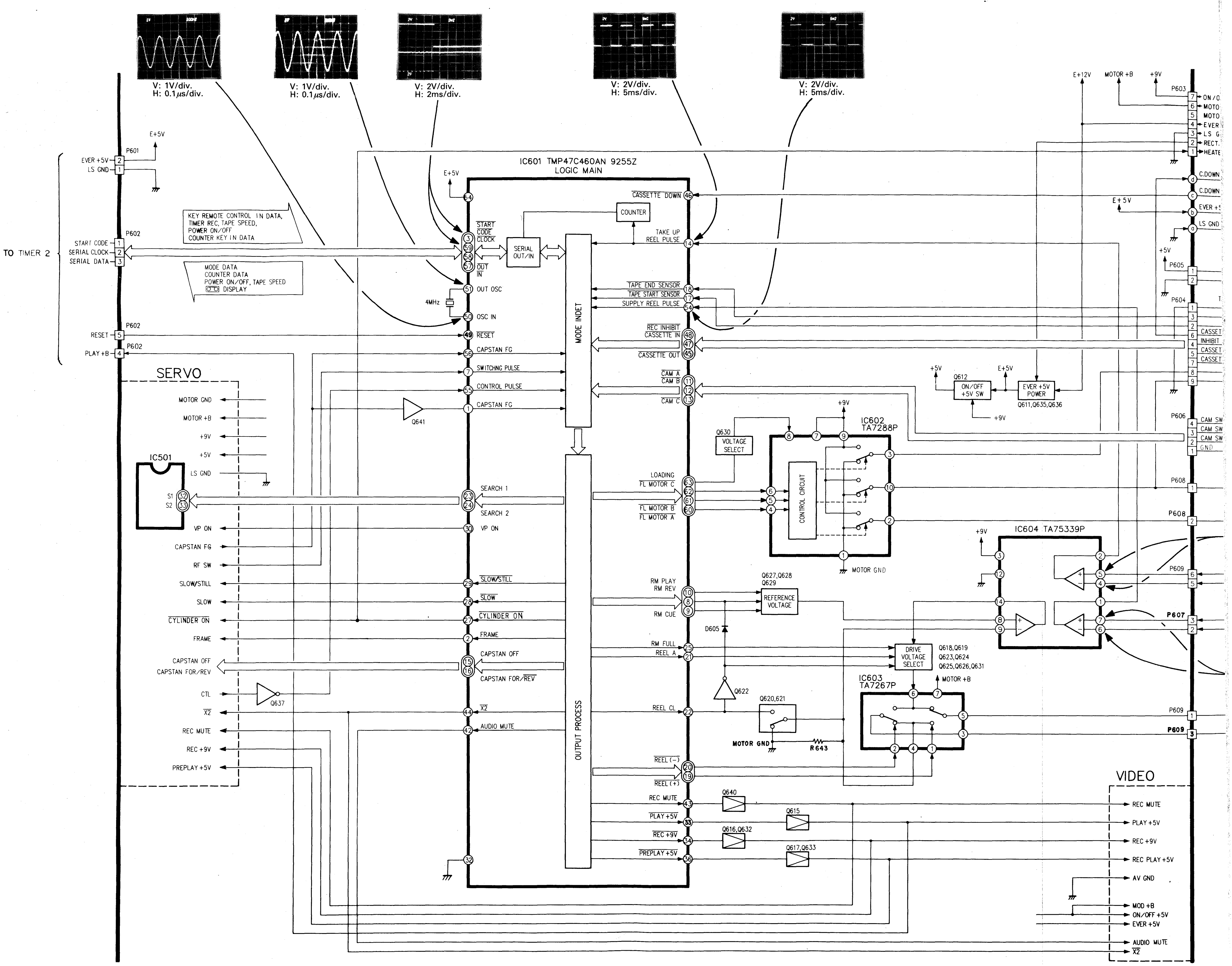

APPROX 14.0ms
a
b
c
d
e
f
g
h
IN0
CLOCK SET
WEEK
ON MIN (+) /CH 1
CH (+)
COUNTER /ERAPSED
IN1
PROGRAM /CFM
DAY
ON MIN (−) /CH 10
CH (−)
RESET
IN2
TIMER
HOUR /SEARCH
OFF MIN (+) /FINE (+)
PRESET
MEMORY
IN3
OTR
CLEAR
OFF MIN (−) /FINE (−)
VPS
IN4
V-93G
14G
13G
12G
11G
10G
9G
8G
7G
6G
5G
4G
3G
2G
1G
PM
(UP)
M
(DWN)
LP
AM
OFF
(R)
TH
FR
SA
(L)
LINE
CATV
REC
VTR
a
b
c
d
e
f
g
h
i

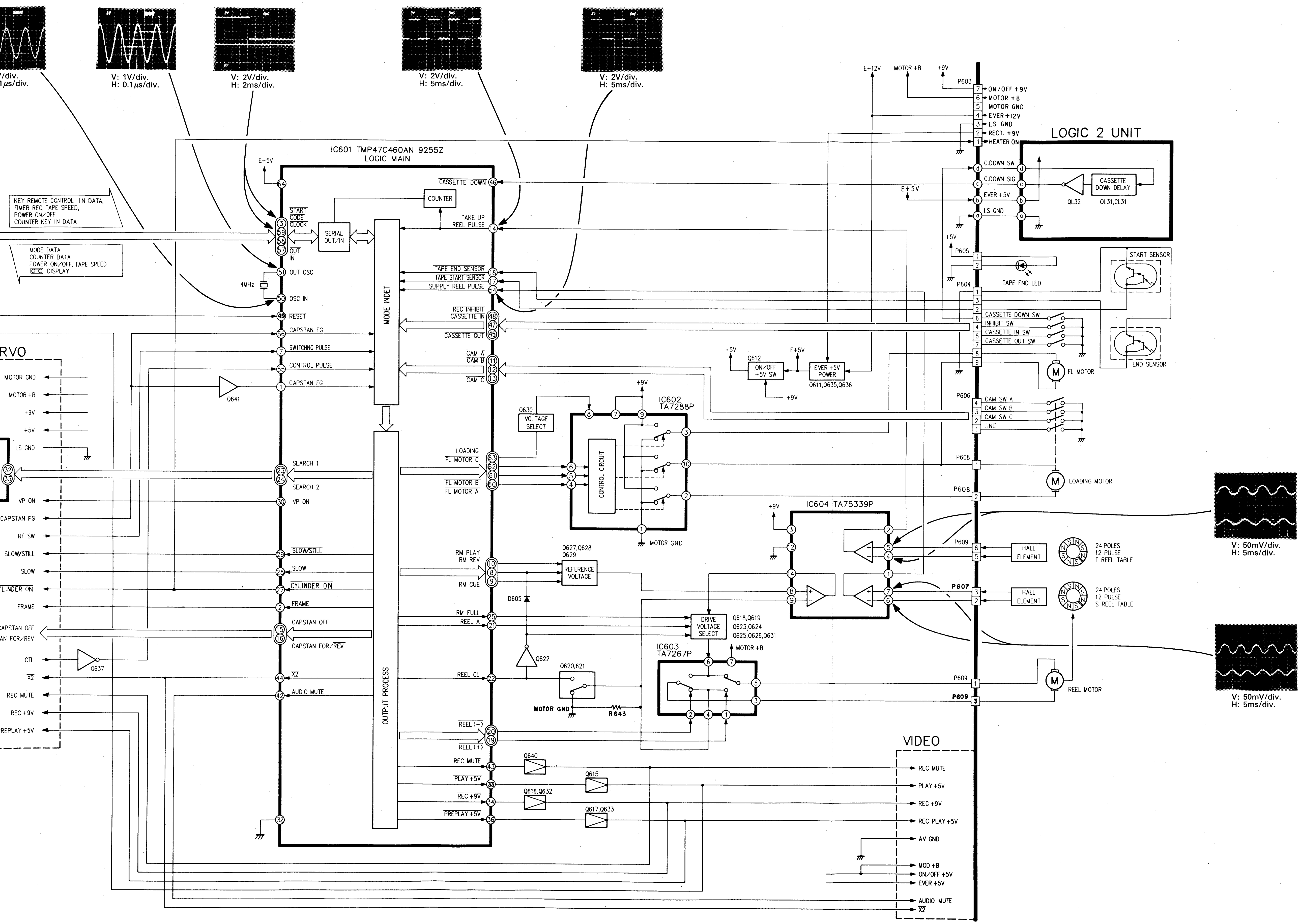

ICX64
TMP47C410AN6696Z
+5V
SDA
SCL
CLK
HOLD
RESET
X OUT
X IN
TEST
V2
V1
T2
T1
GND
V: 1V/div.
H: 2ms/div.
PIF
PIF+12V
COMPOSITE VIDEO SIGNAL
ICX66 SAA5235
(VPS DATA LINE SLICER)
CX73
CX70
CX75
CX76
CX77
CX78
CX79
CX80
SYNC SLICER
SYNC BUFFER
GAIN SWITCH
OSCILLATOR
HF LOSS COMPENSATOR
DIVIDER BY-2
DATALINE SLICER
PHASE SHIFT
DATA LINE CLOCK BUFFER
PHASE DETECTOR
DATA LATCHES
DATA LINE BUFFER
CX81
XX61
10MHz
LX60
CX82
CX74
V: 0.5V/div.
H: 50ns/div.
ICX65 SAF1135P
(VPS DATA LINE DECODER)
Vss
VDD
POWER ON RESET
TIMING
LINE 16 DECODER
STARTCODE DETECTION
I²C BUS MODUL
DATA VALID CONTROL
REGISTER BANKS (2 x 40 Bit)
V: 2V/div.
H: 20ms/div.
ICX64 TMP47C410 AN − 6696Z
(VPS MICRO COMPUTER)
VDD
RESET
I²C BUS INTERFACE
NOISE REJECTION
BINARY → DECIMAL
OUTPUT PROCESS
SERIAL INPUT OUTPUT
XX60
4MHz
Vss
TIMER 2
QX61, QX63
RX64, RX65
EVER+5V
PIF ON
VPS ON
V: 2V/div.
H: 20ms/div.
PX61
VPS ON
VPS RESET
VPS CLOCK
T− DATA 1
T− DATA 2
V− DATA 1
V− DATA 2
TO TIMER
V: 1V/div.
H: 2ms/div.
V: 2V/div.
H: 0.2μs/div.
V: 1V/div.
H: 2ms/div.
V: 2V/div.
H: 0.2μs/div.
V: 2V/div.
H: 20ms/div.
V: 2V/div.
H: 20ms/div.

○ : HIGH ACTIVE

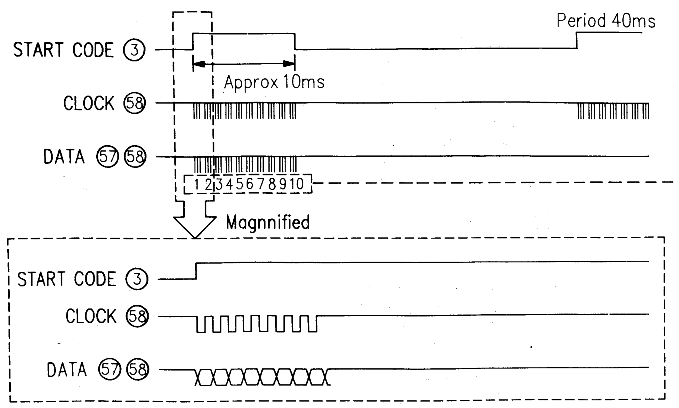
● : LOW ACTIVE

10-1. Logic Block Diagram


V: 1V/div.
H: 0.1μs/div.
V: 1V/div.
H: 0.1μs/div.
V: 2V/div.
H: 2ms/div.
V: 2V/div.
H: 5ms/div.
V: 2V/div.
H: 5ms/div.
TO TIMER 2
E+5V
P601
EVER +5V
LS GND
P602
START CODE
SERIAL CLOCK
SERIAL DATA
RESET
PLAY +B
KEY REMOTE CONTROL IN DATA, TIMER REC, TAPE SPEED, POWER ON/OFF COUNTER KEY IN DATA
MODE DATA COUNTER DATA POWER ON/OFF, TAPE SPEED DISPLAY
IC601 TMP47C460AN 9255Z
LOGIC MAIN
START CODE
CLOCK
OUT
IN
OUT OSC
OSC IN
4MHz
RESET
CAPSTAN FG
SWITCHING PULSE
CONTROL PULSE
CAPSTAN FG
Q641
SERIAL OUT/IN
COUNTER
MODE INDET
OUTPUT PROCESS
CASSETTE DOWN
TAKE UP REEL PULSE
TAPE END SENSOR
TAPE START SENSOR
SUPPLY REEL PULSE
REC INHIBIT
CASSETTE IN
CASSETTE OUT
CAM A
CAM B
CAM C
SERVO
MOTOR GND
MOTOR +B
+9V
+5V
LS GND
IC501
S1
S2
SEARCH 1
SEARCH 2
VP ON
CAPSTAN FG
RF SW
SLOW/STILL
SLOW
CYLINDER ON
FRAME
CAPSTAN OFF
CAPSTAN FOR/REV
CTL
X2
REC MUTE
REC +9V
PREPLAY +5V
Q637
AUDIO MUTE
LOADING
FL MOTOR C
FL MOTOR B
FL MOTOR A
Q630
VOLTAGE SELECT
IC602
TA7288P
CONTROL CIRCUIT
MOTOR GND
RM PLAY
RM REV
RM CUE
Q627,Q628
Q629
REFERENCE VOLTAGE
D605
RM FULL
REEL A
DRIVE VOLTAGE SELECT
Q618,Q619
Q623,Q624
Q625,Q626,Q631
IC603
TA7267P
MOTOR +B
REEL CL
Q622
Q620,621
MOTOR GND
R643
REEL (−)
REEL (+)
REC MUTE
PLAY +5V
REC +9V
PREPLAY +5V
Q640
Q615
Q616,Q632
Q617,Q633
IC604 TA75339P
Q612
ON/OFF +5V SW
EVER +5V POWER
Q611,Q635,Q636
E+12V
MOTOR +B
P603
ON/O
MOTO
MOTO
EVER
LS G
RECT.
HEATE
C.DOWN
C.DOWN
EVER +5
LS GND
P605
P604
CASSET
INHIBIT
CASSET
CASSET
P606
CAM SW
CAM SW
CAM SW
GND
P608
P608
P609
P607
P609
P609
VIDEO
REC MUTE
PLAY +5V
REC +9V
REC PLAY +5V
AV GND
MOD +B
ON/OFF +5V
EVER +5V
AUDIO MUTE
X2


/div.
1μs/div.
V: 1V/div.
H: 0.1μs/div.
V: 2V/div.
H: 2ms/div.
V: 2V/div.
H: 5ms/div.
V: 2V/div.
H: 5ms/div.
IC601 TMP47C460AN 9255Z
LOGIC MAIN
E+5V
KEY REMOTE CONTROL IN DATA,
TIMER REC, TAPE SPEED,
POWER ON/OFF
COUNTER KEY IN DATA
MODE DATA
COUNTER DATA
POWER ON/OFF, TAPE SPEED
DISPLAY
START
CODE
CLOCK
OUT
IN
SERIAL OUT/IN
COUNTER
CASSETTE DOWN
TAKE UP
REEL PULSE
OUT OSC
4MHz
OSC IN
RESET
CAPSTAN FG
SWITCHNG PULSE
CONTROL PULSE
CAPSTAN FG
Q641
MODE INDET
TAPE END SENSOR
TAPE START SENSOR
SUPPLY REEL PULSE
REC INHIBIT
CASSETTE IN
CASSETTE OUT
CAM A
CAM B
CAM C
RVO
MOTOR GND
MOTOR +B
+9V
+5V
LS GND
VP ON
CAPSTAN FG
RF SW
SLOW/STILL
SLOW
LINDER ON
FRAME
APSTAN OFF
AN FOR/REV
CTL
Q637
X2
REC MUTE
REC +9V
REPLAY +5V
SEARCH 1
SEARCH 2
VP ON
SLOW/STILL
SLOW
CYLINDER ON
FRAME
CAPSTAN OFF
CAPSTAN FOR/REV
X2
AUDIO MUTE
OUTPUT PROCESS
LOADING
FL MOTOR C
FL MOTOR B
FL MOTOR A
RM PLAY
RM REV
RM CUE
RM FULL
REEL A
REEL CL
REEL (−)
REEL (+)
REC MUTE
PLAY +5V
REC +9V
PREPLAY +5V
Q630
VOLTAGE SELECT
+9V
IC602
TA7288P
CONTROL CIRCUIT
MOTOR GND
Q627,Q628
Q629
REFERENCE VOLTAGE
D605
Q622
Q620,621
MOTOR GND
R643
DRIVE VOLTAGE SELECT
Q618,Q619
Q623,Q624
Q625,Q626,Q631
IC603
TA7267P
MOTOR +B
Q640
Q615
Q616,Q632
Q617,Q633
+5V
Q612
ON/OFF +5V SW
E+5V
EVER +5V POWER
Q611,Q635,Q636
+9V
+9V
IC604 TA75339P
E+12V
MOTOR +B
+9V
P603
ON/OFF +9V
MOTOR +B
MOTOR GND
EVER +12V
LS GND
RECT. +9V
HEATER ON
LOGIC 2 UNIT
C.DOWN SW
C.DOWN SIG
EVER +5V
LS GND
E+5V
CASSETTE DOWN DELAY
QL32
QL31,CL31
+5V
P605
TAPE END LED
P604
START SENSOR
CASSETTE DOWN SW
INHIBIT SW
CASSETTE IN SW
CASSETTE OUT SW
END SENSOR
FL MOTOR
P606
CAM SW A
CAM SW B
CAM SW C
GND
P608
LOADING MOTOR
P608
P609
HALL ELEMENT
24 POLES
12 PULSE
T REEL TABLE
P607
HALL ELEMENT
24 POLES
12 PULSE
S REEL TABLE
P609
REEL MOTOR
P609
V: 50mV/div.
H: 5ms/div.
V: 50mV/div.
H: 5ms/div.
VIDEO
REC MUTE
PLAY +5V
REC +9V
REC PLAY +5V
AV GND
MOD +B
ON/OFF +5V
EVER +5V
AUDIO MUTE
X2

Serial Transmission


START CODE ③
Period 40ms
Approx 10ms
CLOCK (58)
DATA (57) (58)
1 2 3 4 5 6 7 8 9 10
Magnnified
START CODE ③
CLOCK (58)
DATA (57) (58)

CONTENTS OF DATA (57) (58)

No.	TRANSMISSION MICROCOMPUTER	DATA
1	TIMER	POWER ON/OFF, COUNTERMEMORY, AUTO SENSOR
2	LOGIC	MODE DATA, TAPE SPEED, REC INHIBIT, ⌼ DISPLAY
3	TIMER	TV/VCR, KEY DATA
4	LOGIC	COUNTER MODE, MODE DATA
5	TIMER	COUNTER, BACK-UP
6	LOGIC	COUNTER
7	TIMER	COUNTER, BACK-UP
8	LOGIC	COUNTER
9	TIMER	CHECK, SUM
10	LOGIC	CHECK, SUM

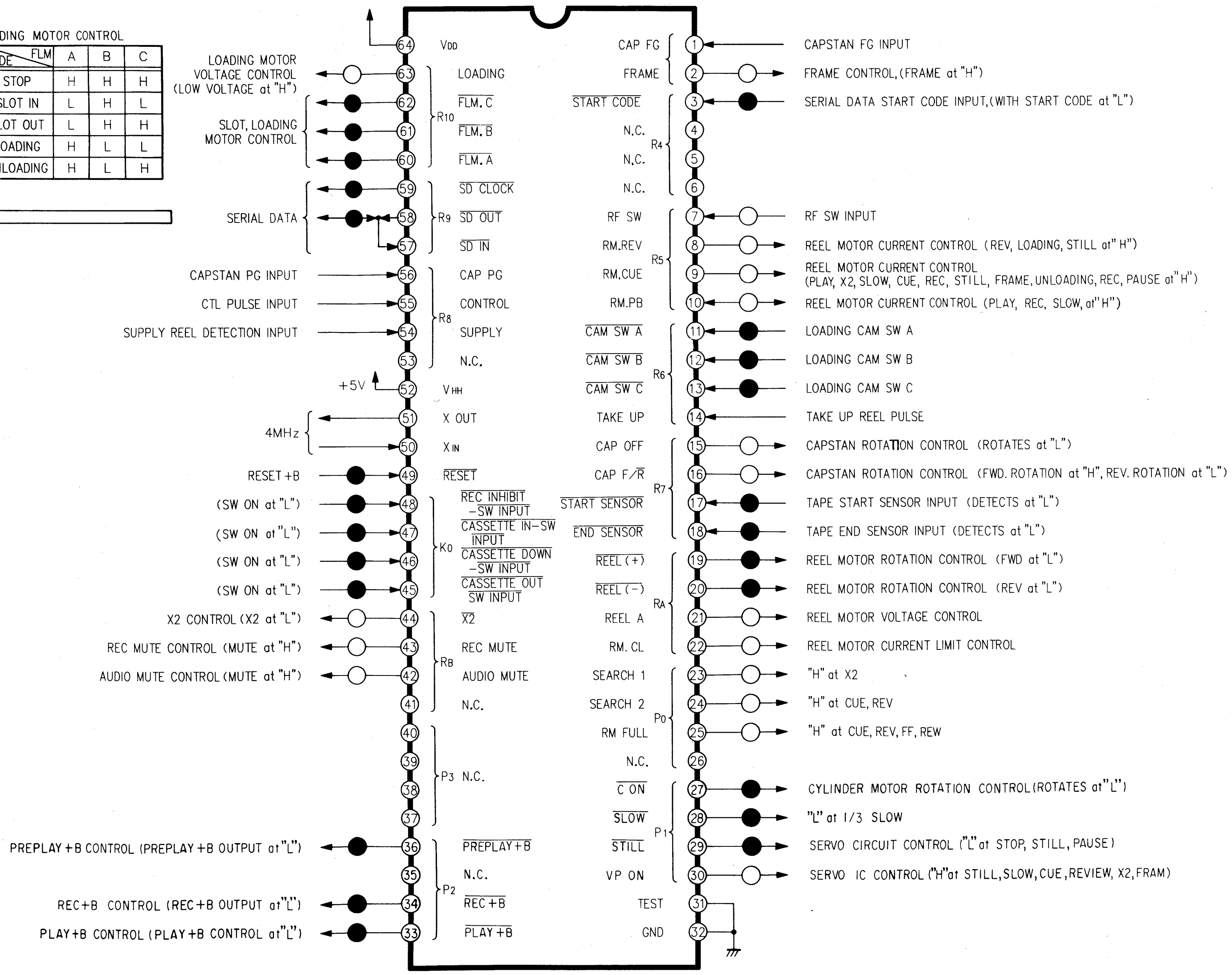
MICROCOMPUTER TERMINAL FUNCTION

LOADING MOTOR CONTROL

MODE \ FLM	A	B	C
STOP	H	H	H
SLOT IN	L	H	L
SLOT OUT	L	H	H
LOADING	H	L	L
UNLOADING	H	L	H

IC601 LOGIC MICROCOMPUTER TPM47C 460AN9255Z

○ : HIGH ACTIVE
● : LOW ACTIVE


64 VDD
63 LOADING
62 FLM.C
61 FLM.B
60 FLM.A
R10
59 SD CLOCK
58 SD OUT
57 SD IN
R9
56 CAP PG
55 CONTROL
54 SUPPLY
53 N.C.
R8
52 VHH
51 X OUT
50 XIN
49 RESET
48 REC INHIBIT -SW INPUT
47 CASSETTE IN-SW INPUT
46 CASSETTE DOWN -SW INPUT
45 CASSETTE OUT SW INPUT
K0
44 X2
43 REC MUTE
42 AUDIO MUTE
41 N.C.
RB
40 39 38 37 P3 N.C.
36 PREPLAY+B
35 N.C.
34 REC+B
33 PLAY+B
P2
LOADING MOTOR VOLTAGE CONTROL (LOW VOLTAGE at "H")
SLOT, LOADING MOTOR CONTROL
SERIAL DATA
CAPSTAN PG INPUT
CTL PULSE INPUT
SUPPLY REEL DETECTION INPUT
+5V
4MHz
RESET+B
(SW ON at "L")
(SW ON at "L")
(SW ON at "L")
(SW ON at "L")
X2 CONTROL (X2 at "L")
REC MUTE CONTROL (MUTE at "H")
AUDIO MUTE CONTROL (MUTE at "H")
PREPLAY+B CONTROL (PREPLAY+B OUTPUT at "L")
REC+B CONTROL (REC+B OUTPUT at "L")
PLAY+B CONTROL (PLAY+B CONTROL at "L")
1 CAP FG
2 FRAME
3 START CODE
4 N.C.
5 N.C.
6 N.C.
R4
7 RF SW
8 RM.REV
9 RM.CUE
10 RM.PB
R5
11 CAM SW A
12 CAM SW B
13 CAM SW C
14 TAKE UP
R6
15 CAP OFF
16 CAP F/R
17 START SENSOR
18 END SENSOR
R7
19 REEL (+)
20 REEL (-)
21 REEL A
22 RM. CL
RA
23 SEARCH 1
24 SEARCH 2
25 RM FULL
26 N.C.
P0
27 C ON
28 SLOW
29 STILL
30 VP ON
P1
31 TEST
32 GND
CAPSTAN FG INPUT
FRAME CONTROL, (FRAME at "H")
SERIAL DATA START CODE INPUT, (WITH START CODE at "L")
RF SW INPUT
REEL MOTOR CURRENT CONTROL (REV, LOADING, STILL at "H")
REEL MOTOR CURRENT CONTROL (PLAY, X2, SLOW, CUE, REC, STILL, FRAME, UNLOADING, REC, PAUSE at "H")
REEL MOTOR CURRENT CONTROL (PLAY, REC, SLOW, at "H")
LOADING CAM SW A
LOADING CAM SW B
LOADING CAM SW C
TAKE UP REEL PULSE
CAPSTAN ROTATION CONTROL (ROTATES at "L")
CAPSTAN ROTATION CONTROL (FWD. ROTATION at "H", REV. ROTATION at "L")
TAPE START SENSOR INPUT (DETECTS at "L")
TAPE END SENSOR INPUT (DETECTS at "L")
REEL MOTOR ROTATION CONTROL (FWD at "L")
REEL MOTOR ROTATION CONTROL (REV at "L")
REEL MOTOR VOLTAGE CONTROL
REEL MOTOR CURRENT LIMIT CONTROL
"H" at X2
"H" at CUE, REV
"H" at CUE, REV, FF, REW
CYLINDER MOTOR ROTATION CONTROL (ROTATES at "L")
"L" at 1/3 SLOW
SERVO CIRCUIT CONTROL ("L" at STOP, STILL, PAUSE)
SERVO IC CONTROL ("H" at STILL, SLOW, CUE, REVIEW, X2, FRAM)

LOGIC MODE SHIFT TABLE

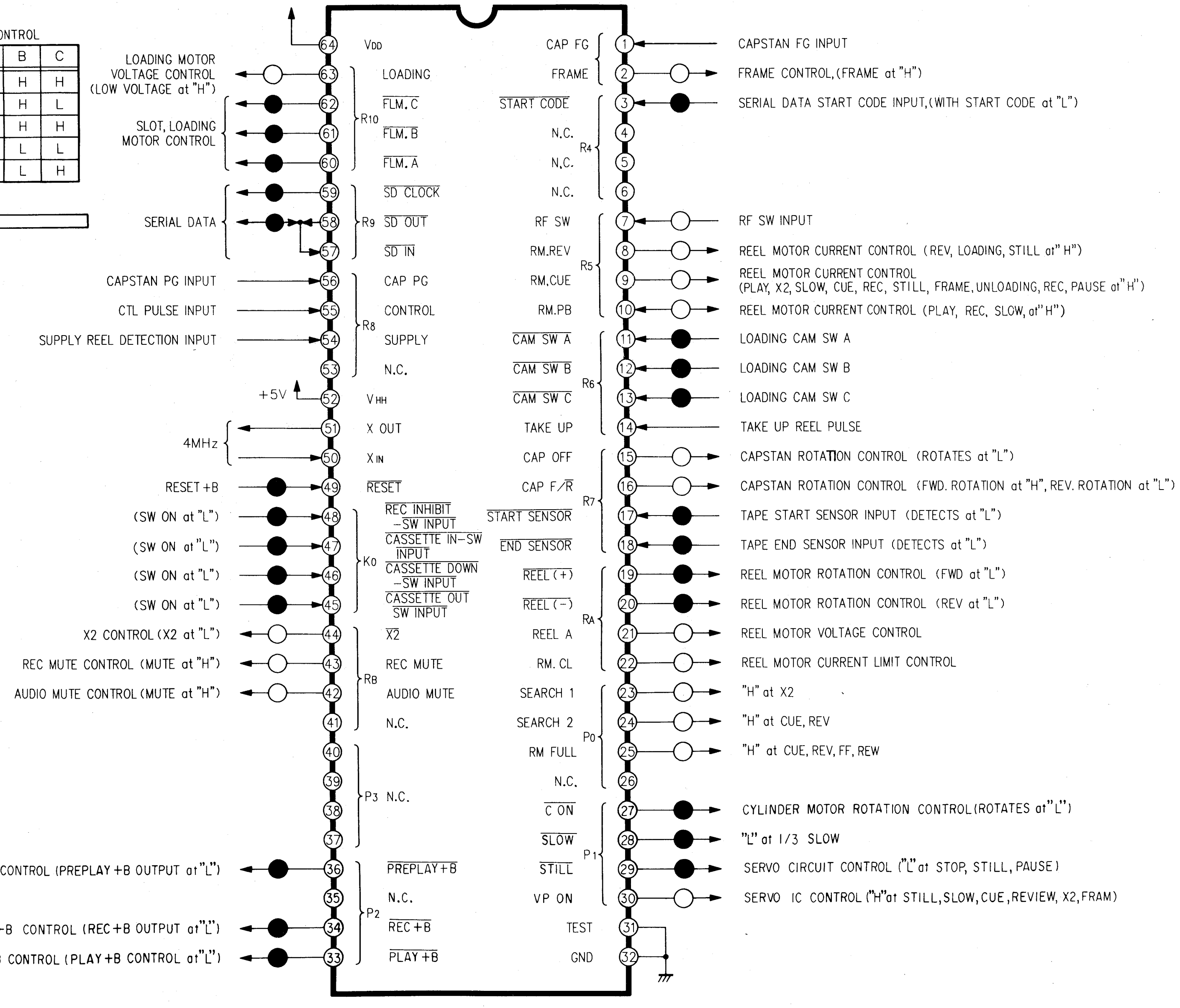
CURRENT MODE \ INPUT MODE	EJECT	REC	STOP
SLOT IN	○	×	—
SLOT OUT	—	×	×
STOP	○	○	—
PLAY	○	×	○
CUE	○	×	○
REVIEW	○	×	○
FF	○	×	○
REW	○	×	○
STILL	○	REC PAUSE	○
REC	×	—	○
REC PAUSE	×	×	○
X2 SPEED PLAY	○	×	○
1/3 SLOW	○	×	○
TIMER REC	×	×	×
FRAME	(—)	(REC PAUSE)	(○)

IC601 (TMP47C860N) LOGIC

PIN No.	PIN \ MODE	SLOT IN	SLOT OUT
10	RM.PB	L	L
8	RM.REV	L	L
9	RM.CUE	L	L
44	$\overline{\text{X2}}$	H	H
15	CAP OFF	H	H
16	CAP F/$\overline{\text{R}}$	H	H
19	$\overline{\text{REEL (+)}}$	H	H
20	$\overline{\text{REEL (−)}}$	H	H
21	REEL A	H	H
22	RM.CL	L	L
23	SEARCH 1	L	L
24	SEARCH 2	L	L
25	RM.FULL	L	L
2	FRAME	L	L
33	$\overline{\text{PLAY +B}}$	H	H
34	$\overline{\text{REC +B}}$	H	H
36	$\overline{\text{PREPLAY +B}}$	H	H
27	$\overline{\text{CYLINDER ON}}$	H	H
28	$\overline{\text{SLOW}}$	H	H
29	$\overline{\text{STILL}}$	L	L
30	VP ON	L	L
43	REC MUTE	H	H
42	AUDIO MUTE	L	L

MPUTER
UNCTION

IC601 LOGIC MICROCOMPUTER
TPM47C 460AN9255Z


○ : HIGH ACTIVE
● : LOW ACTIVE
ONTROL
B C
H H
H L
H H
L L
L H
LOADING MOTOR VOLTAGE CONTROL (LOW VOLTAGE at "H")
SLOT, LOADING MOTOR CONTROL
SERIAL DATA
CAPSTAN PG INPUT
CTL PULSE INPUT
SUPPLY REEL DETECTION INPUT
+5V
4MHz
RESET +B
(SW ON at "L")
(SW ON at "L")
(SW ON at "L")
(SW ON at "L")
X2 CONTROL (X2 at "L")
REC MUTE CONTROL (MUTE at "H")
AUDIO MUTE CONTROL (MUTE at "H")
CONTROL (PREPLAY +B OUTPUT at "L")
-B CONTROL (REC +B OUTPUT at "L")
CONTROL (PLAY +B CONTROL at "L")
64 VDD
63 LOADING
62 FLM. C
61 FLM. B
60 FLM. A
59 SD CLOCK
58 SD OUT
57 SD IN
56 CAP PG
55 CONTROL
54 SUPPLY
53 N.C.
52 VHH
51 X OUT
50 XIN
49 RESET
48 REC INHIBIT -SW INPUT
47 CASSETTE IN-SW INPUT
46 CASSETTE DOWN -SW INPUT
45 CASSETTE OUT SW INPUT
44 X2
43 REC MUTE
42 AUDIO MUTE
41 N.C.
40
39
38
37
N.C.
36 PREPLAY+B
35 N.C.
34 REC +B
33 PLAY +B
R10
R9
R8
K0
RB
P3
P2
1 CAP FG
2 FRAME
3 START CODE
4 N.C.
5 N.C.
6 N.C.
7 RF SW
8 RM.REV
9 RM.CUE
10 RM.PB
11 CAM SW A
12 CAM SW B
13 CAM SW C
14 TAKE UP
15 CAP OFF
16 CAP F/R
17 START SENSOR
18 END SENSOR
19 REEL (+)
20 REEL (-)
21 REEL A
22 RM. CL
23 SEARCH 1
24 SEARCH 2
25 RM FULL
26 N.C.
27 C ON
28 SLOW
29 STILL
30 VP ON
31 TEST
32 GND
R4
R5
R6
R7
RA
P0
P1
CAPSTAN FG INPUT
FRAME CONTROL, (FRAME at "H")
SERIAL DATA START CODE INPUT, (WITH START CODE at "L")
RF SW INPUT
REEL MOTOR CURRENT CONTROL (REV, LOADING, STILL at "H")
REEL MOTOR CURRENT CONTROL (PLAY, X2, SLOW, CUE, REC, STILL, FRAME, UNLOADING, REC, PAUSE at "H")
REEL MOTOR CURRENT CONTROL (PLAY, REC, SLOW, at "H")
LOADING CAM SW A
LOADING CAM SW B
LOADING CAM SW C
TAKE UP REEL PULSE
CAPSTAN ROTATION CONTROL (ROTATES at "L")
CAPSTAN ROTATION CONTROL (FWD. ROTATION at "H", REV. ROTATION at "L")
TAPE START SENSOR INPUT (DETECTS at "L")
TAPE END SENSOR INPUT (DETECTS at "L")
REEL MOTOR ROTATION CONTROL (FWD at "L")
REEL MOTOR ROTATION CONTROL (REV at "L")
REEL MOTOR VOLTAGE CONTROL
REEL MOTOR CURRENT LIMIT CONTROL
"H" at X2
"H" at CUE, REV
"H" at CUE, REV, FF, REW
CYLINDER MOTOR ROTATION CONTROL (ROTATES at "L")
"L" at 1/3 SLOW
SERVO CIRCUIT CONTROL ("L" at STOP, STILL, PAUSE)
SERVO IC CONTROL ("H" at STILL, SLOW, CUE, REVIEW, X2, FRAM)

LOGIC MODE SHIFT TABLE

CURRENT MODE \ INPUT MODE	EJECT	REC	STOP	PAUSE	PLAY	REW	FF	TIMER REC	REMOTE CONTROL		FRAME
									X2 SPEED PLAY	1/3 SLOW	
SLOT IN	○	×	—	×	○	○	○	EJECT	○	×	×
SLOT OUT	—	×	×	×	×	×	×	×	×	×	×
STOP	○	○	—	×	○	○	○	○	○	×	×
PLAY	○	×	○	STILL	—	REVIEW	CUE	○	○	○	×
CUE	○	×	○	×	○	REVIEW	—	○	×	×	×
REVIEW	○	×	○	×	○	—	CUE	○	×	×	×
FF	○	×	○	×	○	○	—	○	○	×	×
REW	○	×	○	×	○	—	○	○	○	×	×
STILL	○	REC PAUSE	○	PLAY	×	REVIEW	CUE	○	○	○	*
REC	×	—	○	REC PAUSE	×	×	×	○	×	×	×
REC PAUSE	×	×	○	REC	×	×	×	○	×	×	×
X2 SPEED PLAY	○	×	○	STILL	○	REVIEW	CUE	○	—	○	×
1/3 SLOW	○	×	○	STILL	○	REVIEW	CUE	○	○	—	×
TIMER REC	×	×	×	×	×	×	×	—	×	×	×
FRAME	(—)	(REC PAUSE)	(○)	(PLAY)	(×)	(REVIEW)	(CUE)	(○)	(○)	(○)	—

Note : 1/3 SLOW AND X2 PLAY MODES CAN BE OPERATED BY REMOTE CONTROLLER. REMOTE CONTROL IS PRIOR TO MAIN UNIT SW.
* FRAME MODE IS CONTINUED WHILE PUSHING FRAME SW.
( ) : INDICATES THE MODE SHIFT WHEN PUSHING REMOTO CONTROL SW WITH FRAM SW OF MAIN UNIT PUSHED. WHEN PUSHING OTHER SW OF MAIN UNIT, MODE SHIFTS TO STILL.

IC601 (TMP47C860N) LOGIC MICROCOMPUTER OUTPUT POLARITY

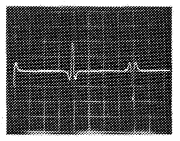
*: DEPENDS ON MODE

PIN No.	PIN \ MODE	SLOT IN	SLOT OUT	LOADING	UNLOADING	STOP	FF	REW	PLAY	X2	STILL	1/3 SLOW	CUE	REVIEW	REC	REC PAUSE	FRAME	POWER OFF
10	RM.PB	L	L	L	L	L	L	L	H	L	L	H	L	L	H	L	L	L
8	RM.REV	L	L	H	L	L	L	L	L	L	H	L	L	H	L	L	⊔ 15msec	L
9	RM.CUE	L	L	L	H	L	L	L	H	H	H	H	H	L	H	H	H	L
44	$\overline{X2}$	H	H	H	H	H	H	H	H	L	H	H	H	H	H	H	H	L
15	CAP OFF	H	H	H	H	H	H	H	L	L	H	L	L	L	L	H	⊔ 15msec	H
16	CAP F/$\overline{R}$	H	H	H	H	H	H	H	H	H	H	H	H	L	H	H	H	H
19	$\overline{REEL(+)}$	H	H	L	H	H	L	H	L	L	L	L	L	H	L	H	L	H
20	$\overline{REEL(-)}$	H	H	H	L	H	H	L	H	H	H	H	H	L	H	H	H	H
21	REEL A	H	H	L	L	L	L	L	L	L	H	L	⎍⎍⎍	⎍⎍⎍	L	H	H	H
22	RM.CL	L	L	L	H	L	L	L	H	H	L	H	H	H	H	L	L	L
23	SEARCH 1	L	L	L	L	L	L	L	L	H	L	L	L	L	L	L	L	L
24	SEARCH 2	L	L	L	L	L	L	L	L	L	L	L	H	H	L	L	L	L
25	RM.FULL	L	L	L	L	L	H	H	L	L	L	L	H	H	L	L	L	L
2	FRAME	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	H	L
33	$\overline{PLAY+B}$	H	H	H	H	H	H	H	L	L	L	L	L	L	H	H	L	H
34	$\overline{REC+B}$	H	H	*	*	H	H	H	H	H	H	H	H	H	L	L	H	H
36	$\overline{PREPLAY+B}$	H	H	*	*	H	H	H	L	L	L	L	L	L	H	H	L	H
27	$\overline{CYLINDER\ ON}$	H	H	L	L	H	H	H	L	L	L	L	L	L	L	L	L	H
28	$\overline{SLOW}$	H	H	H	H	H	H	H	H	H	H	L	H	H	H	H	H	H
29	$\overline{STILL}$	L	L	L	L	L	L	L	H	H	L	H	H	H	H	L	⎍	L
30	VP ON	L	L	L	L	L	L	L	L	H	H	H	H	H	L	L	H	L
43	REC MUTE	H	H	H	H	H	H	H	H	H	H	H	H	H	L	H	H	L
42	AUDIO MUTE	L	L	L	L	L	L	L	L	L	H	H	H	H	L	L	H	L

11-1. Servo Block Diagram

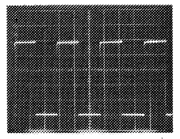
Cylinder Servo

1



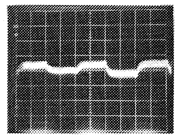
V: 0.5V/div.
H: 5ms/div.

2



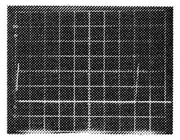
V: 1V/div.
H: 10μs/div.

3



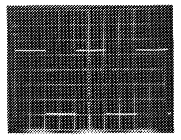
V: 0.1V/div.
H: 10ms/div.

4



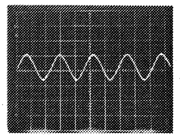
V: 1V/div.
H: 5ms/div.

5



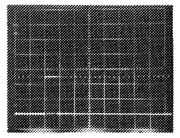
V: 1V/div.
H: 10ms/div.

6

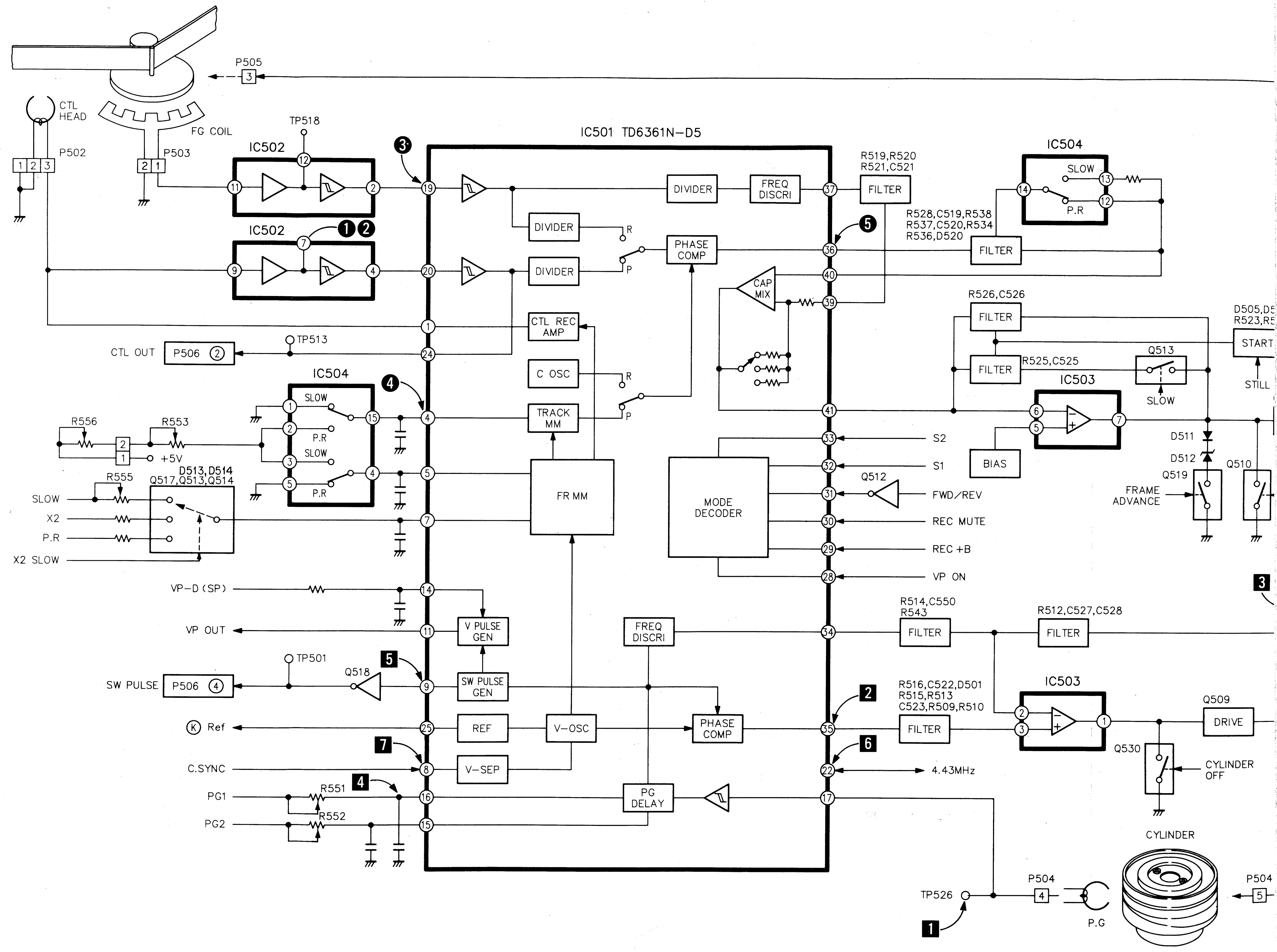


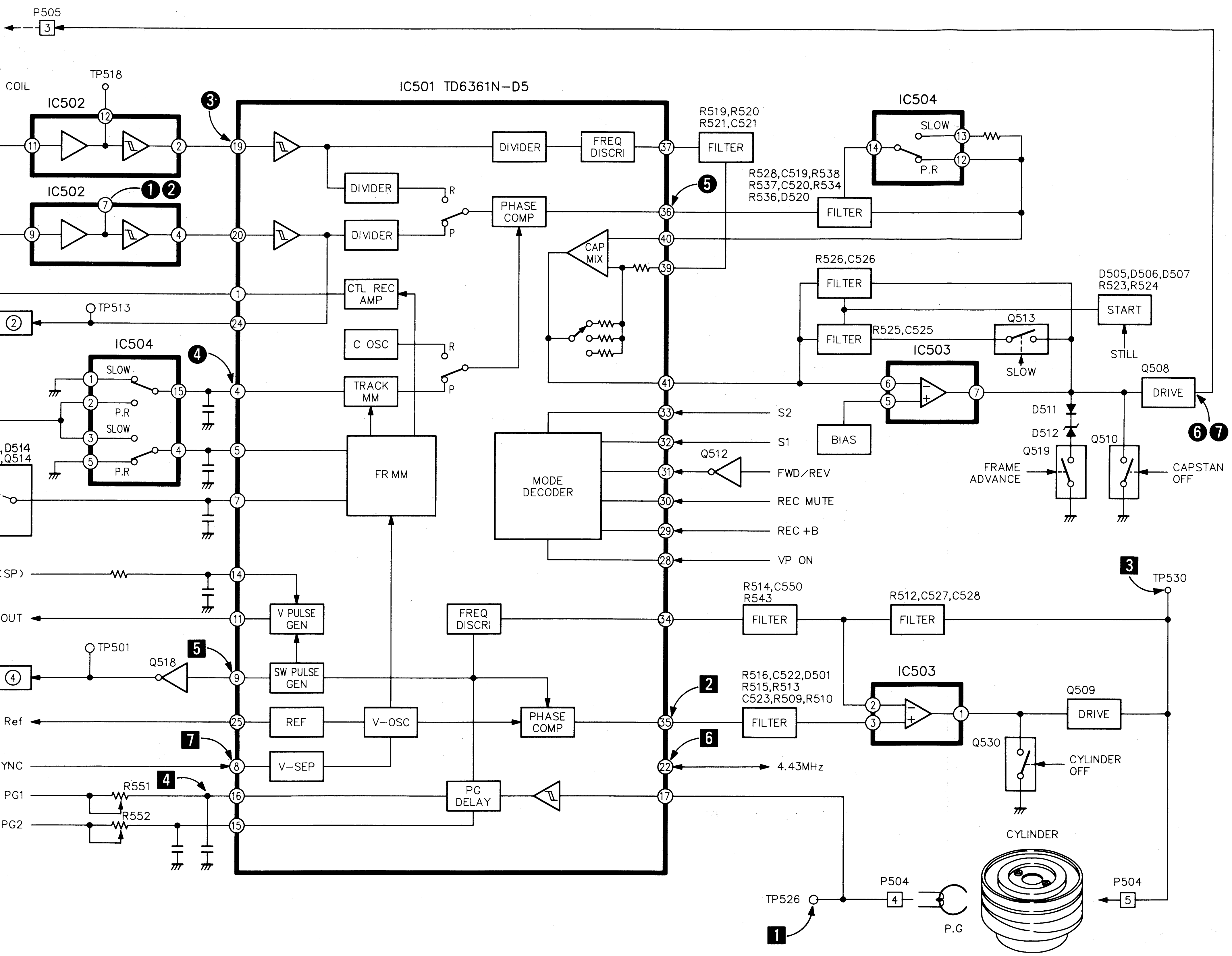
V: 0.2V/div.
H: 0.1μs/div.

7

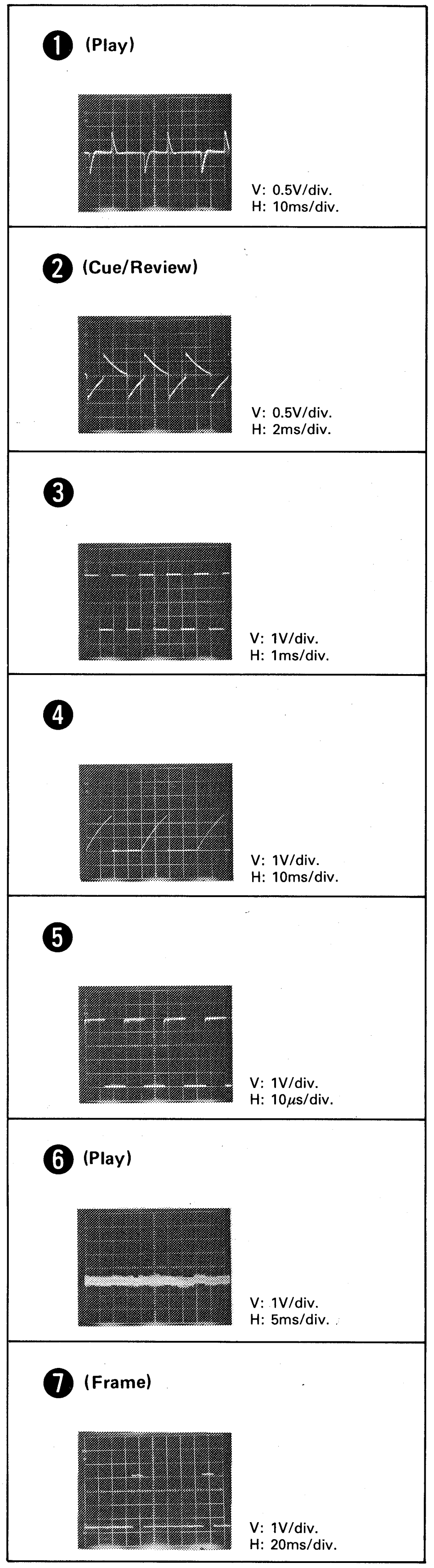


V: 2V/div.
H: 0.2ms/div.


P505
CTL HEAD
FG COIL
P502
P503
TP518
IC502
IC502
IC501 TD6361N-D5
DIVIDER
FREQ DISCRI
DIVIDER
PHASE COMP
DIVIDER
CAP MIX
CTL REC AMP
C OSC
TRACK MM
FR MM
MODE DECODER
V PULSE GEN
SW PULSE GEN
REF
V-OSC
V-SEP
FREQ DISCRI
PHASE COMP
PG DELAY
R519,R520
R521,C521
FILTER
IC504
SLOW
P.R
R528,C519,R538
R537,C520,R534
R536,D520
FILTER
R526,C526
FILTER
FILTER
R525,C525
Q513
SLOW
IC503
BIAS
D505,D5
R523,R5
START
STILL
D511
D512
Q519
Q510
FRAME ADVANCE
S2
S1
Q512
FWD/REV
REC MUTE
REC +B
VP ON
CTL OUT
P506 ②
TP513
IC504
SLOW
P.R
SLOW
P.R
R556
R553
+5V
R555
D513,D514
Q517,Q513,Q514
SLOW
X2
P.R
X2 SLOW
VP-D (SP)
VP OUT
TP501
Q518
SW PULSE
P506 ④
Ⓚ Ref
C.SYNC
PG1
PG2
R551
R552
R514,C550
R543
FILTER
R512,C527,C528
FILTER
R516,C522,D501
R515,R513
C523,R509,R510
FILTER
IC503
Q509
DRIVE
Q530
CYLINDER OFF
4.43MHz
CYLINDER
TP526
P504
P.G
P504


P505
COIL
TP518
IC501 TD6361N–D5
IC502
IC502
IC504
IC504
IC503
IC503
DIVIDER
FREQ DISCRI
FILTER
R519,R520
R521,C521
SLOW
P.R
R528,C519,R538
R537,C520,R534
R536,D520
FILTER
PHASE COMP
CAP MIX
R526,C526
FILTER
D505,D506,D507
R523,R524
START
FILTER
R525,C525
Q513
STILL
SLOW
Q508
DRIVE
CTL REC AMP
TP513
C OSC
TRACK MM
FR MM
MODE DECODER
S2
S1
Q512
FWD/REV
REC MUTE
REC +B
VP ON
BIAS
D511
D512
Q519
Q510
FRAME ADVANCE
CAPSTAN OFF
D514
Q514
SP)
OUT
Ref
YNC
PG1
PG2
R551
R552
V PULSE GEN
SW PULSE GEN
REF
V–OSC
V–SEP
FREQ DISCRI
PHASE COMP
PG DELAY
TP501
Q518
R514,C550
R543
FILTER
R512,C527,C528
FILTER
TP530
R516,C522,D501
R515,R513
C523,R509,R510
FILTER
Q509
DRIVE
Q530
CYLINDER OFF
4.43MHz
CYLINDER
TP526
P504
P.G
P504

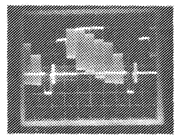
Capstan Servo



12-1. Video Block Diagram

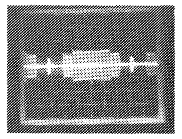
Record Mode

1



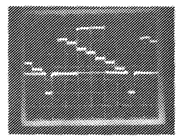
V: 0.2V/div.
H: 10µs/div.

8



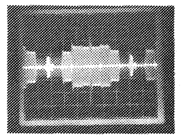
V: 0.5V/div.
H: 10µs/div.

2



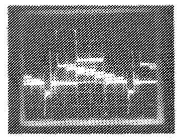
V: 0.1V/div.
H: 10µs/div.

9



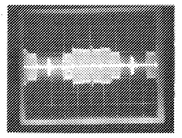
V: 0.2V/div.
H: 10µs/div.

3



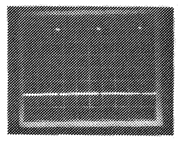
V: 0.2V/div.
H: 10µs/div.

10



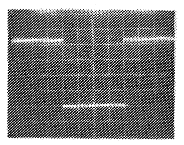
V: 0.1V/div.
H: 10µs/div.

4



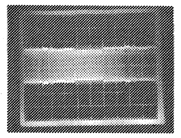
V: 1V/div.
H: 20µs/div.

5



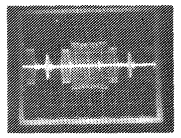
V: 1V/div.
H: 5ms/div.

6

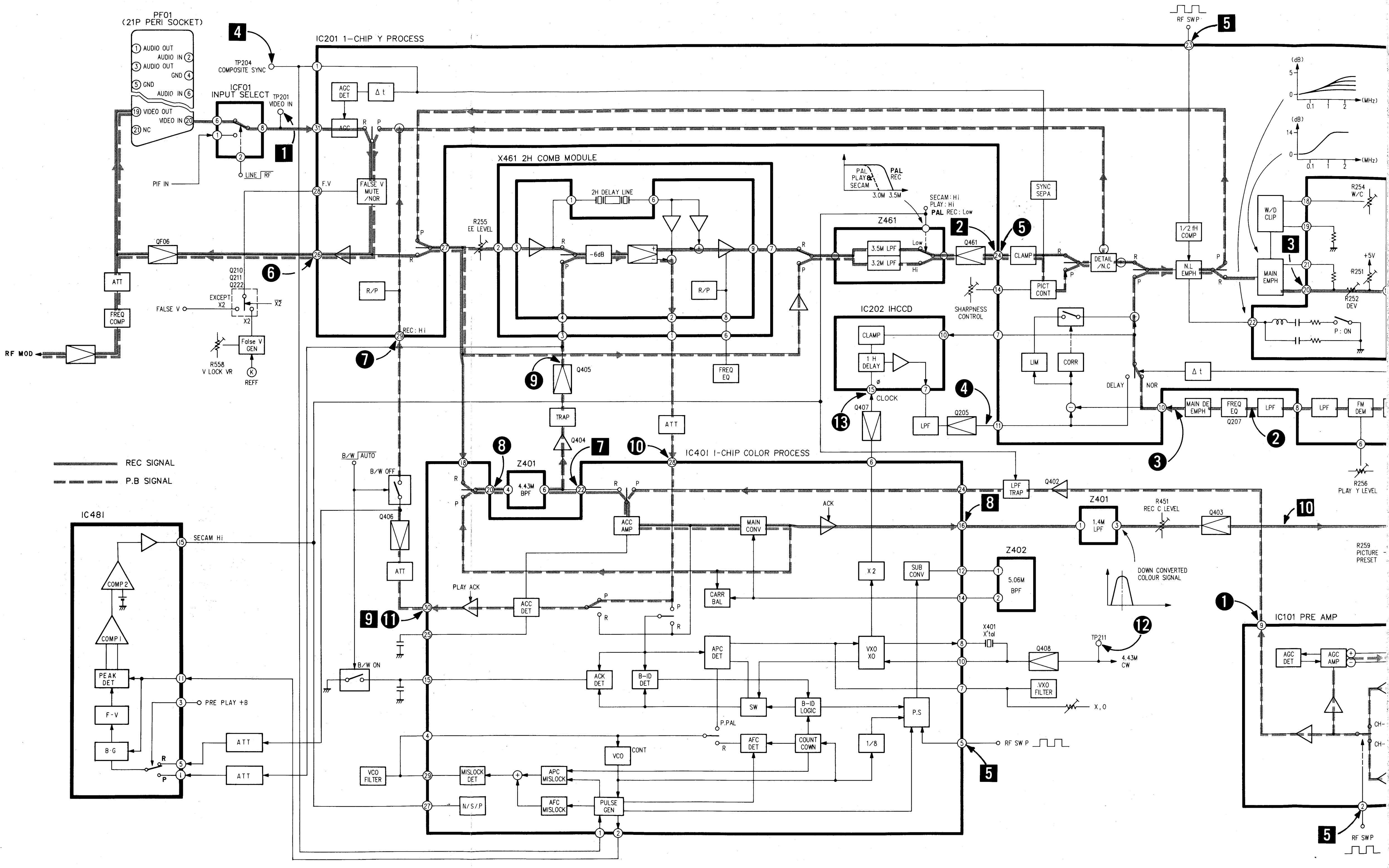


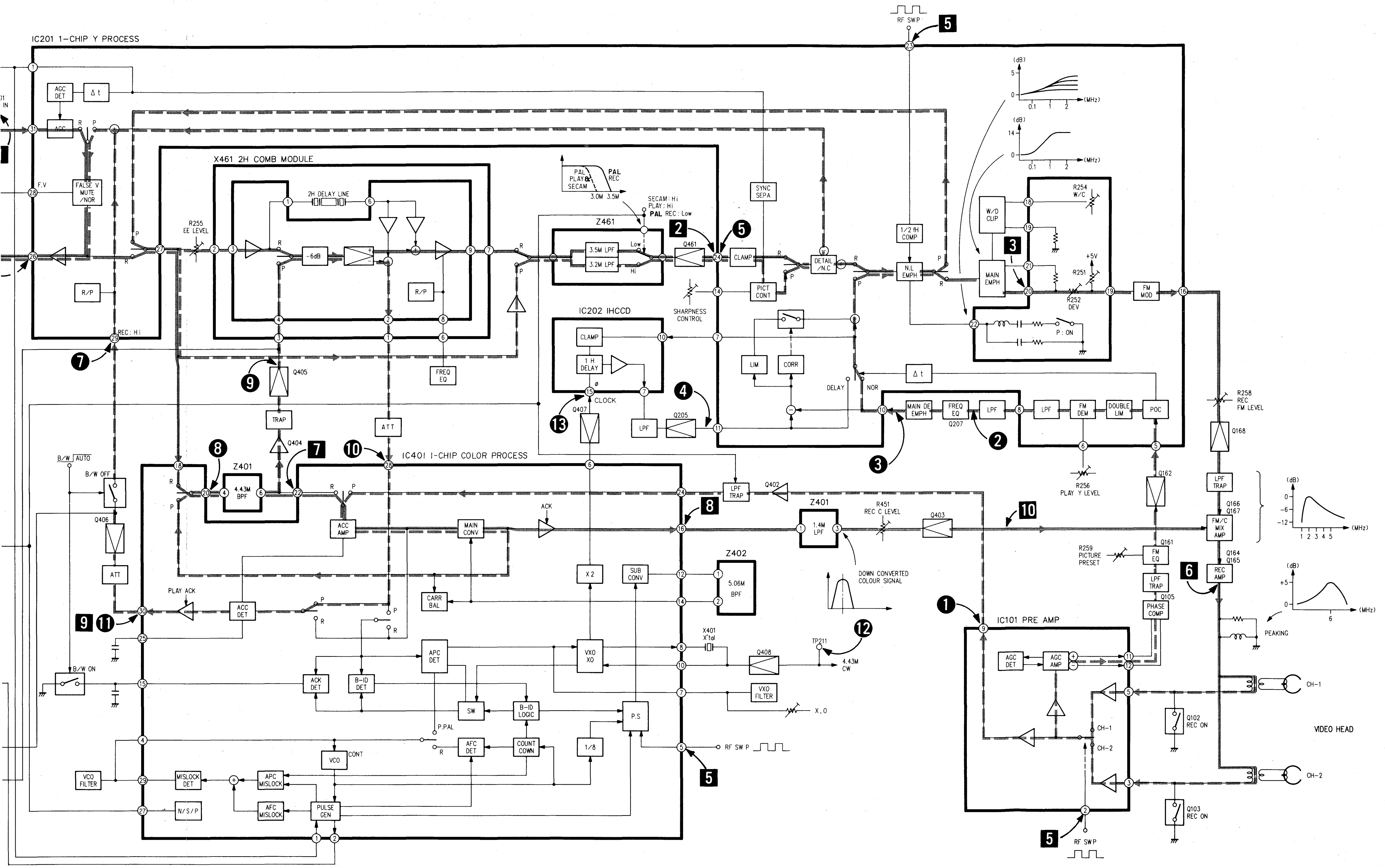
V: 0.1V/div.
H: 10µs/div.

7

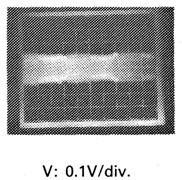
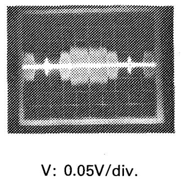
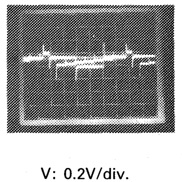
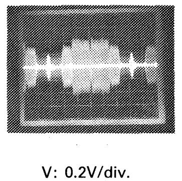
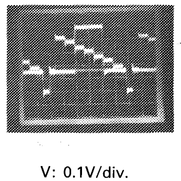
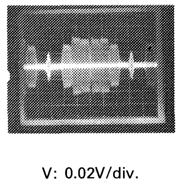
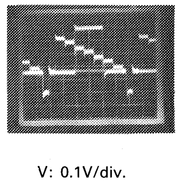
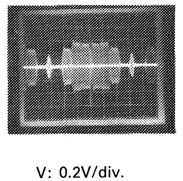
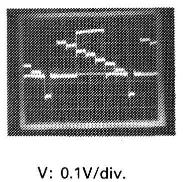
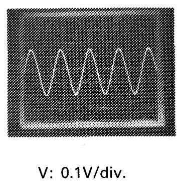
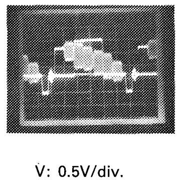
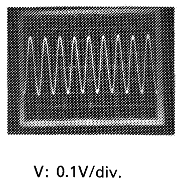
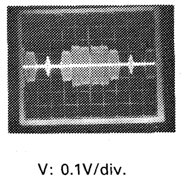


V: 0.05V/div.
H: 10µs/div.

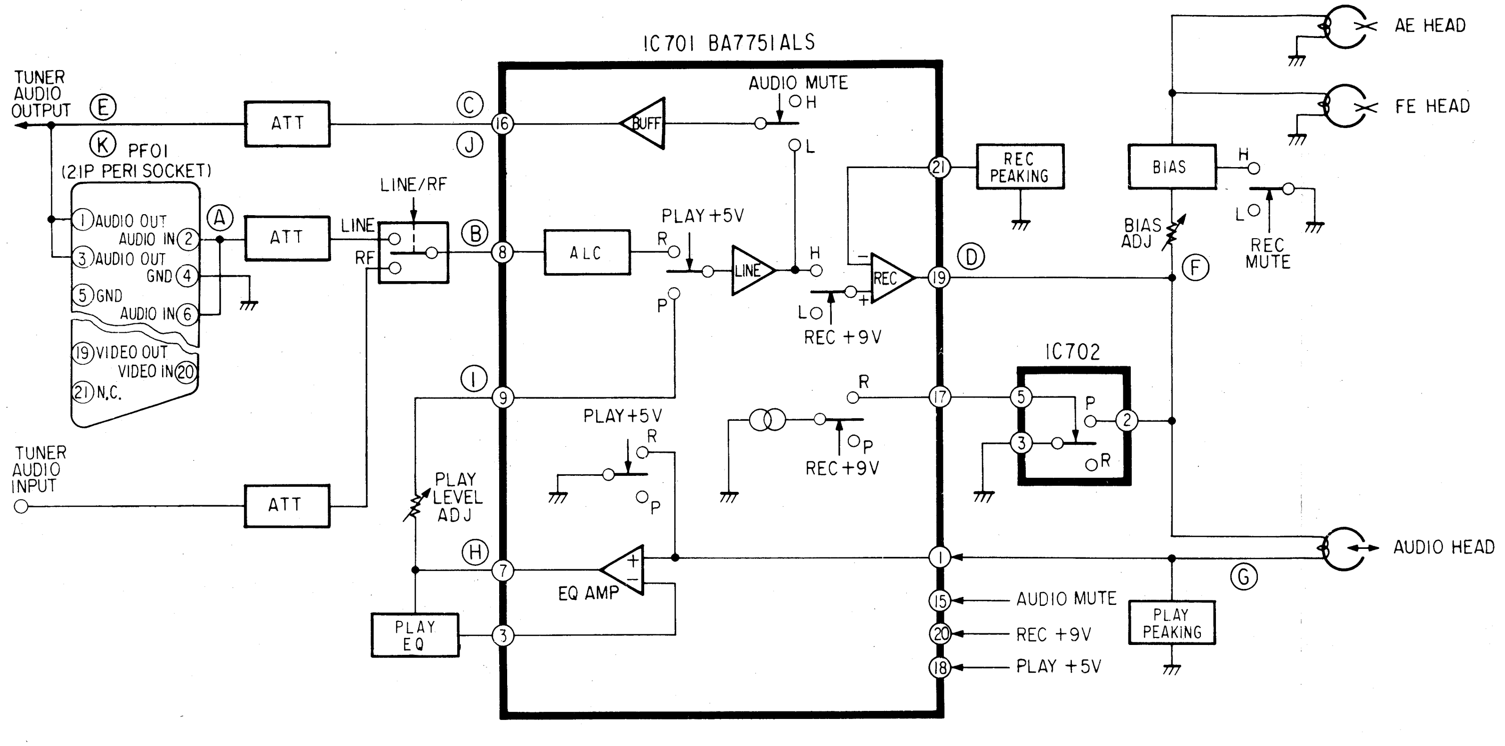

PF01
(21P PERI SOCKET)
AUDIO OUT
AUDIO IN
AUDIO OUT
GND
GND
AUDIO IN
VIDEO OUT
VIDEO IN
NC
TP204
COMPOSITE SYNC
ICF01
INPUT SELECT
TP201
VIDEO IN
LINE RF
PIF IN
QF06
ATT
FREQ COMP
RF MOD
FALSE V
EXCEPT X2
Q210 Q211 Q222
R558
V LOCK VR
False V GEN
REFF
IC201 1-CHIP Y PROCESS
AGC DET
Δt
AGC
F.V
FALSE V MUTE /NOR
R/P
REC : Hi
X461 2H COMB MODULE
R255
EE LEVEL
2H DELAY LINE
-6dB
R/P
FREQ EQ
PAL PLAY
PAL REC
SECAM
3.0M 3.5M
SECAM : Hi
PLAY : Hi
PAL REC : Low
Z461
3.5M LPF
3.2M LPF
Low
Hi
Q461
CLAMP
SYNC SEPA
SHARPNESS CONTROL
PICT CONT
DETAIL /N.C
LIM
CORR
IC202 IHCCD
CLAMP
1 H DELAY
CLOCK
Q407
LPF
Q205
DELAY
NOR
Δt
MAIN DE EMPH
FREQ EQ
Q207
LPF
LPF
FM DEM
RF SWP
1/2 fH COMP
N.L EMPH
W/D CLIP
MAIN EMPH
R254 W/C
R251
R252 DEV
+5V
P : ON
(dB)
(MHz)
0.1
1
2
5
0
14
R256
PLAY Y LEVEL
Q405
TRAP
Q404
ATT
Q406
ATT
B/W AUTO
B/W OFF
B/W ON
IC401 I-CHIP COLOR PROCESS
Z401
4.43M BPF
ACC AMP
MAIN CONV
ACK
LPF TRAP
Q402
Z401
1.4M LPF
R451
REC C LEVEL
Q403
R259
PICTURE PRESET
DOWN CONVERTED COLOUR SIGNAL
PLAY ACK
ACC DET
CARR BAL
X 2
SUB CONV
Z402
5.06M BPF
X401
X'tal
Q408
TP211
4.43M CW
VXO XO
VXO FILTER
X, 0
APC DET
ACK DET
B-ID DET
SW
B-ID LOGIC
P.S
P.PAL
AFC DET
COUNT DOWN
1/8
RF SW P
VCO
CONT
VCO FILTER
MISLOCK DET
APC MISLOCK
AFC MISLOCK
PULSE GEN
N/S/P
IC101 PRE AMP
AGC DET
AGC AMP
CH-
IC481
SECAM Hi
COMP 2
COMP 1
PEAK DET
F-V
B·G
PRE PLAY +8
ATT
ATT
REC SIGNAL
P.B SIGNAL


IC201 1-CHIP Y PROCESS
RF SWP
AGC DET
Δ t
AGC
FALSE V MUTE /NOR
F.V
R/P
REC : Hi
X461 2H COMB MODULE
2H DELAY LINE
-6dB
R255 EE LEVEL
FREQ EQ
Q405
TRAP
Q404
ATT
Z461
3.5M LPF
3.2M LPF
Low
Hi
PAL PLAY & SECAM
PAL REC
3.0M 3.5M
SECAM : Hi
PLAY : Hi
PAL REC : Low
Q461
CLAMP
SHARPNESS CONTROL
PICT CONT
SYNC SEPA
DETAIL /N.C
1/2 fH COMP
N.L EMPH
W/D CLIP
MAIN EMPH
R254 W/C
R251
R252 DEV
+5V
P : ON
FM MOD
IC202 IHCCD
CLAMP
1 H DELAY
CLOCK
Q407
LPF
Q205
LIM
CORR
DELAY
NOR
MAIN DE EMPH
FREQ EQ
Q207
LPF
FM DEM
DOUBLE LIM
POC
R256 PLAY Y LEVEL
B/W AUTO
B/W OFF
Q406
ATT
PLAY ACK
B/W ON
VCO FILTER
Z401
4.43M BPF
IC401 1-CHIP COLOR PROCESS
ACC AMP
MAIN CONV
ACK
ACC DET
CARR BAL
X 2
SUB CONV
Z402
5.06M BPF
APC DET
VXO XO
ACK DET
B-ID DET
SW
B-ID LOGIC
P.S
P.PAL
AFC DET
COUNT COWN
1/8
VCO
CONT
MISLOCK DET
APC MISLOCK
AFC MISLOCK
PULSE GEN
N/S/P
X401 X'tal
Q408
VXO FILTER
X, O
RF SW P
TP211
4.43M CW
LPF TRAP
Q402
Z401
1.4M LPF
R451 REC C LEVEL
Q403
DOWN CONVERTED COLOUR SIGNAL
Q162
R259 PICTURE PRESET
FM EQ
Q161
LPF TRAP
Q105
PHASE COMP
IC101 PRE AMP
AGC DET
AGC AMP
CH-1
CH-2
Q102 REC ON
Q103 REC ON
R258 REC FM LEVEL
Q168
LPF TRAP
Q166 Q167
FM/C MIX AMP
Q164 Q165
REC AMP
PEAKING
VIDEO HEAD
(dB)
(MHz)

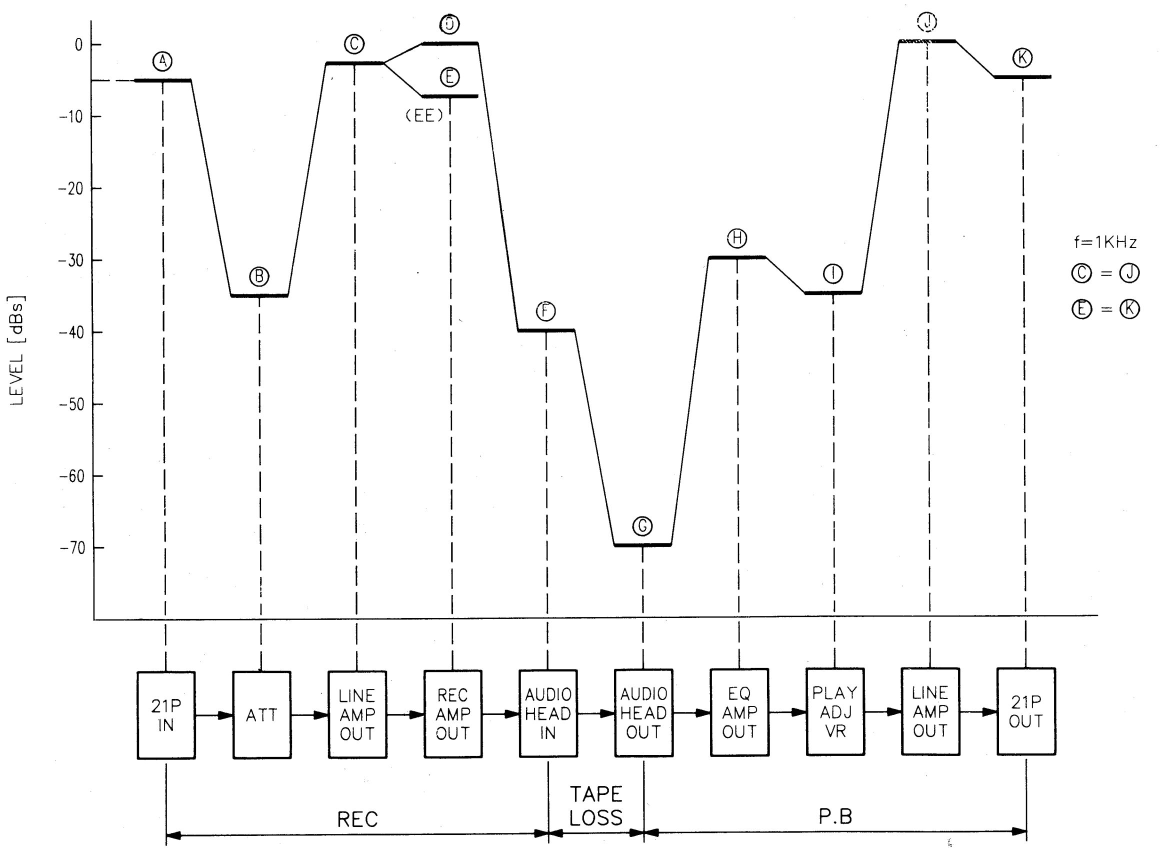
Playback Mode

❶  V: 0.1V/div. H: 5ms/div.	❽  V: 0.05V/div. H: 10µs/div.
❷  V: 0.2V/div. H: 10µs/div.	❾  V: 0.2V/div. H: 10µs/div.
❸  V: 0.1V/div. H: 10µs/div.	❿  V: 0.02V/div. H: 10µs/div.
❹  V: 0.1V/div. H: 10µs/div.	⓫  V: 0.2V/div. H: 10µs/div.
❺  V: 0.1V/div. H: 10µs/div.	⓬  V: 0.1V/div. H: 0.1µs/div.
❻  V: 0.5V/div. H: 10µs/div.	⓭  V: 0.1V/div. H: 0.1µs/div.
❼  V: 0.1V/div. H: 10µs/div.	

13-1. Audio Block Diagram


IC701 BA7751ALS
TUNER AUDIO OUTPUT Ⓔ
Ⓚ PF01 (21P PERI SOCKET)
①AUDIO OUT
AUDIO IN②
③AUDIO OUT
GND④
⑤GND
AUDIO IN⑥
⑲VIDEO OUT
VIDEO IN⑳
㉑N.C.
TUNER AUDIO INPUT
ATT
ATT
ATT
LINE/RF
LINE
RF
Ⓐ Ⓑ Ⓒ Ⓓ Ⓕ Ⓖ Ⓗ Ⓘ Ⓙ
BUFF
AUDIO MUTE
H
L
ALC
PLAY +5V
R
P
LINE
H
REC
L
REC +9V
REC PEAKING
BIAS
BIAS ADJ
H
L
REC MUTE
AE HEAD
FE HEAD
AUDIO HEAD
IC702
P
R
PLAY +5V
R
P
REC +9V
PLAY LEVEL ADJ
EQ AMP
PLAY EQ
AUDIO MUTE
REC +9V
PLAY +5V
PLAY PEAKING
⑯ ⑧ ⑨ ⑦ ③ ㉑ ⑲ ⑰ ① ⑮ ⑳ ⑱ ⑤ ③ ②

Pin ① or ③ of AV terminal.

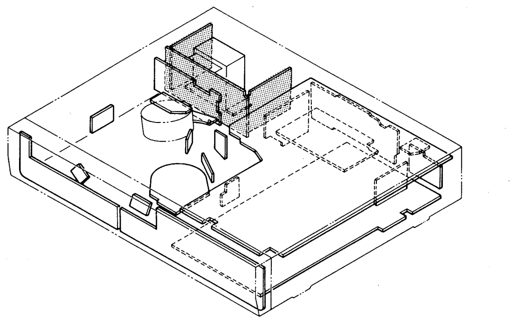


---

1 2 3 4 5 6

A B C D E F G

7-2. Power Supply PC Board



Voltage and Location of Transistors

Symbol No.	Q801			Q802			Q803			Q804	
	E	C	B	E	C	B	E	C	B	E	C
STAND-BY	0	0.8	1.28	0	0	4.5	0	4.5	0	9.7	1.8
EE	0	0.8	1.28	0	4.0	0	0	0	2.0	9.2	1.8
PLAY	0	15.9	0	0	4.0	0	0	0	2.0	9.0	1.8
REC	0	15.4	0	0	4.0	0	0	0	2.0	9.0	1.8
LOCATION	E-7			E-7			E-7			E-7	

Location of Diodes

Symbol No.	Loca-tion
D801	E-7
D802	E-7
D803	E-7
D804	E-7
D805	F-6
D806	F-6
D807	E-6
D808	F-6
D809	E-7
D810	E-7
D821	D-9
D822	D-9
D824	D-10
D825	D-10

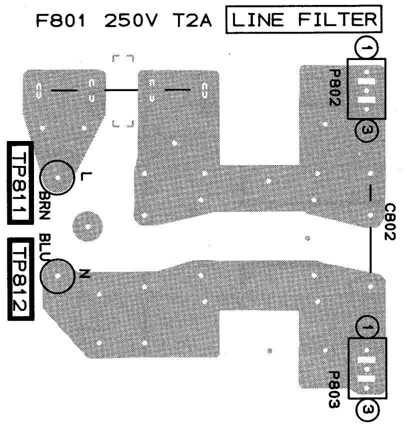
Location of IC

Symbol No.	Loca-tion
IC811	D-10

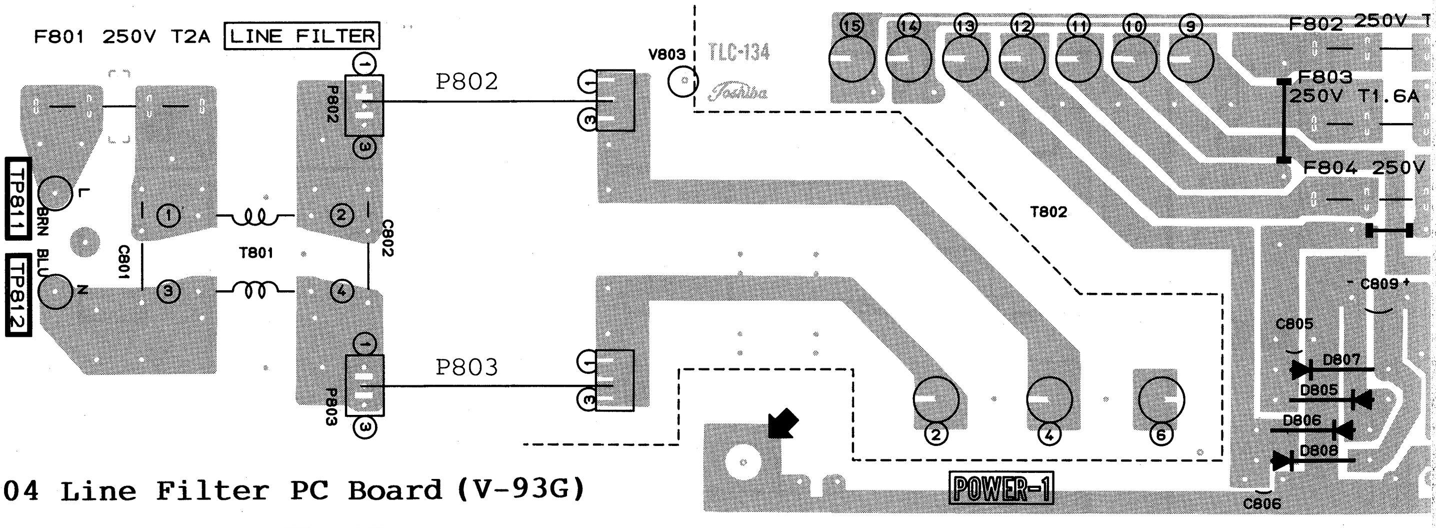
Location of Adjusting VR

Smbol No.	Loca-tion
R851	C-10

To RG01

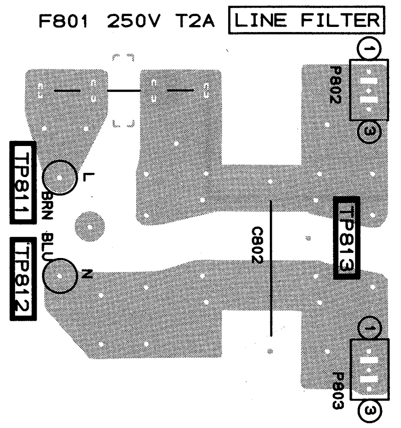

F801 250V T2A
LINE FILTER
P802
P803
C802
TP811
TP812
BRN
BLU
L
N
①
③

U804 Line Filter PC Board (V-93T)

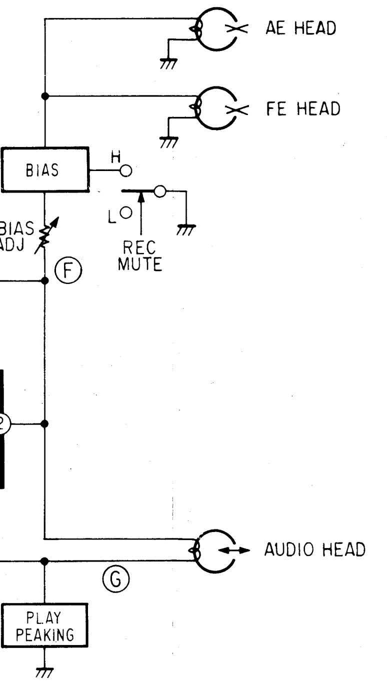

F801 250V T2A
LINE FILTER
P802
P803
TP811
TP812
BRN
BLU
L
N
T801
C801
C802
① ② ③ ④
V803
TLC-134
Toshiba
T802
F802 250V T
F803 250V T1.6A
F804 250V
C809
C805
C806
D807
D805
D806
D808
⑮ ⑭ ⑬ ⑫ ⑪ ⑩ ⑨
② ④ ⑥
POWER-1

U804 Line Filter PC Board (V-93G)

U802 Power PC Board

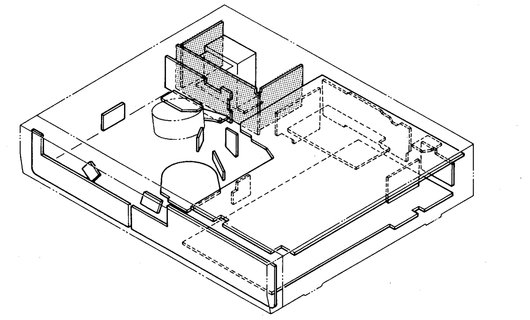

F801 250V T2A
LINE FILTER
P802
P803
C802
TP811
TP812
TP813
BRN
BLU
L
N
①
③

U804 Line Filter PC Board (V-93W)


AE HEAD
FE HEAD
BIAS
H
L
BIAS ADJ
Ⓕ
REC MUTE
AUDIO HEAD
Ⓖ
PLAY PEAKING

f=1KHz
Ⓒ = Ⓙ
Ⓔ = Ⓚ

7-2. Power Supply PC Board



Voltage and Location of Transistors (Unit:V)

Symbol No.	Q801			Q802			Q803			Q804			Q812			Q813		
	E	C	B	E	C	B	E	C	B	E	C	B	E	C	B	E	C	B
STAND-BY	0	0.8	1.28	0	0	4.5	0	4.5	0	9.7	1.8	9.7	12.0	18.4	12.6	0	17.5	0
EE	0	0.8	1.28	0	4.0	0	0	0	2.0	9.2	1.8	9.2	12.0	18.0	12.6	9.0	16.5	9.6
PLAY	0	15.9	0	0	4.0	0	0	0	2.0	9.0	1.8	9.0	12.0	17.5	12.6	9.0	15.7	9.6
REC	0	15.4	0	0	4.0	0	0	0	2.0	9.0	1.8	9.0	12.0	17.5	12.6	9.0	15.5	9.6
LOCATION	E-7			E-7			E-7			E-7			D-10			D-10		

Location of Diodes

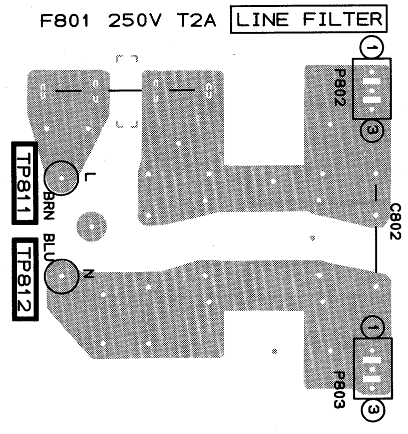
Symbol No.	Location
D801	E-7
D802	E-7
D803	E-7
D804	E-7
D805	F-6
D806	F-6
D807	E-6
D808	F-6
D809	E-7
D810	E-7
D821	D-9
D822	D-9
D824	D-10
D825	D-10

Location of IC

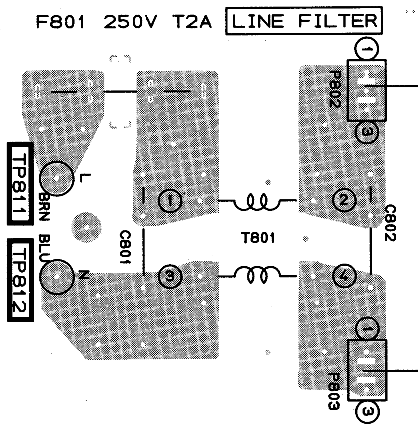
Symbol No.	Location
IC811	D-10

Location of Adjusting VR

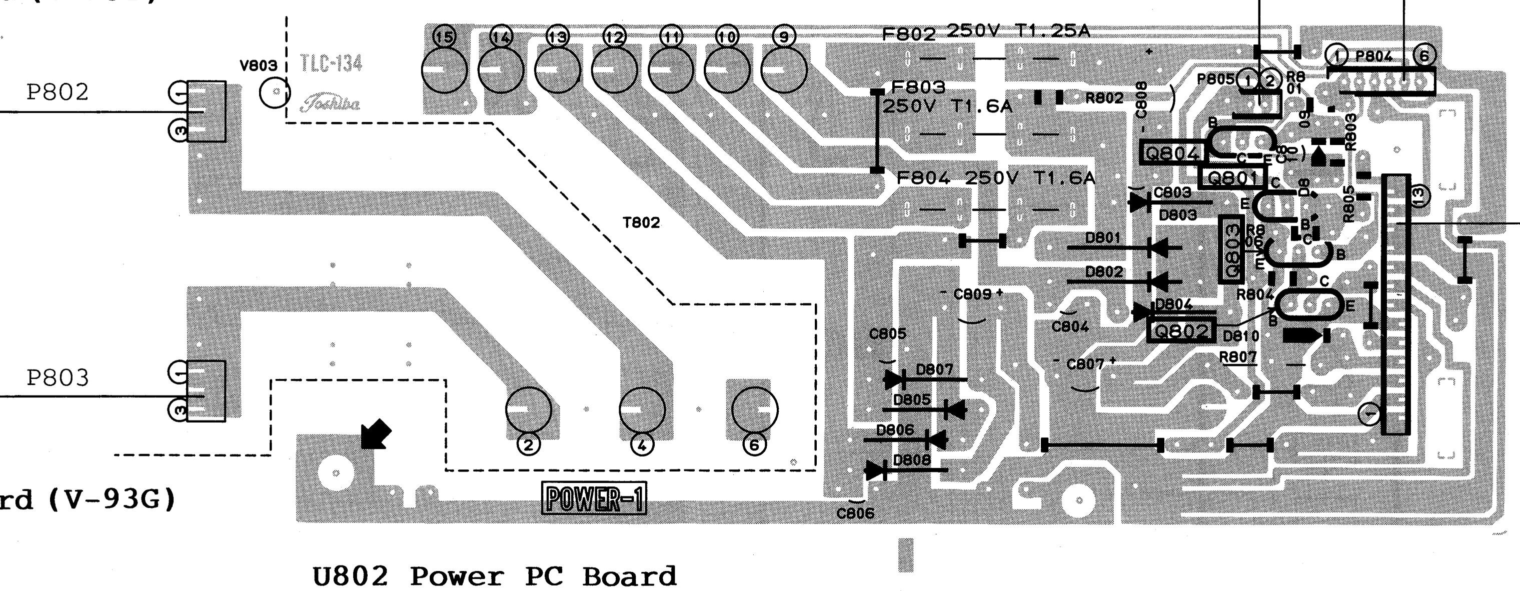
Smbol No.	Location
R851	C-10


F801 250V T2A
LINE FILTER
P802
P803
TP811
TP812
BRN
BLU
L
N
C802

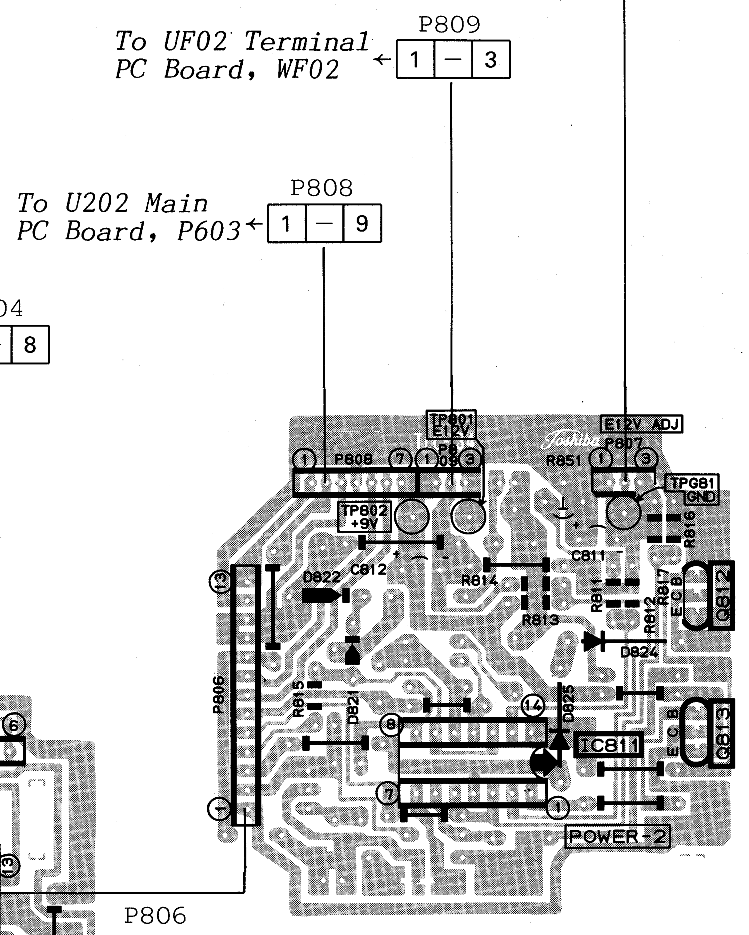
U804 Line Filter PC Board (V-93T)


F801 250V T2A
LINE FILTER
P802
P803
TP811
TP812
BRN
BLU
C801
C802
T801

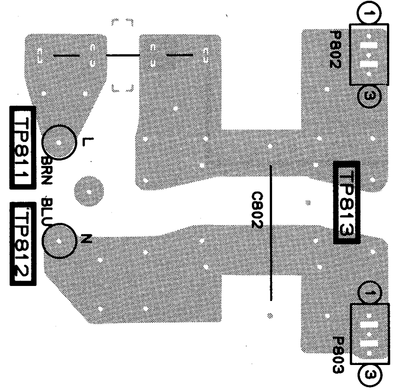
U804 Line Filter PC Board (V-93G)


P802
P803
V803
TLC-134
Toshiba
F802 250V T1.25A
F803 250V T1.6A
F804 250V T1.6A
T802
P805
P804
P806
Q801
Q802
Q803
Q804
D801
D802
D803
D804
D805
D806
D807
D808
D810
C803
C804
C805
C806
C807
C808
C809
R802
R804
R805
R807
POWER-1
To RG01 Dew Heater
P805 1 2
To U002 Timer 2 PC Board, PL63
P804 1 8

U802 Power PC Board

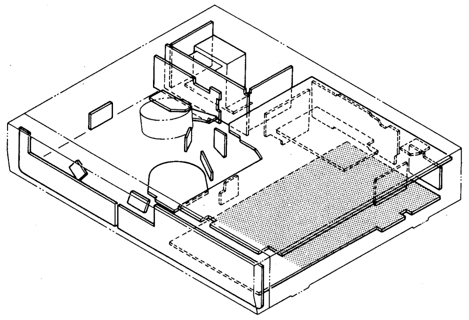

Test Connector
P807 1 3
To UF02 Terminal PC Board, WF02
P809 1 3
To U202 Main PC Board, P603
P808 1 9
P808
TP801 E12V
E12V ADJ
TP802 +9V
TPG81 GND
Toshiba
R851
D821
D822
D824
D825
C811
C812
R811
R812
R813
R814
R815
R816
R817
IC811
Q812
Q813
P806
POWER-2

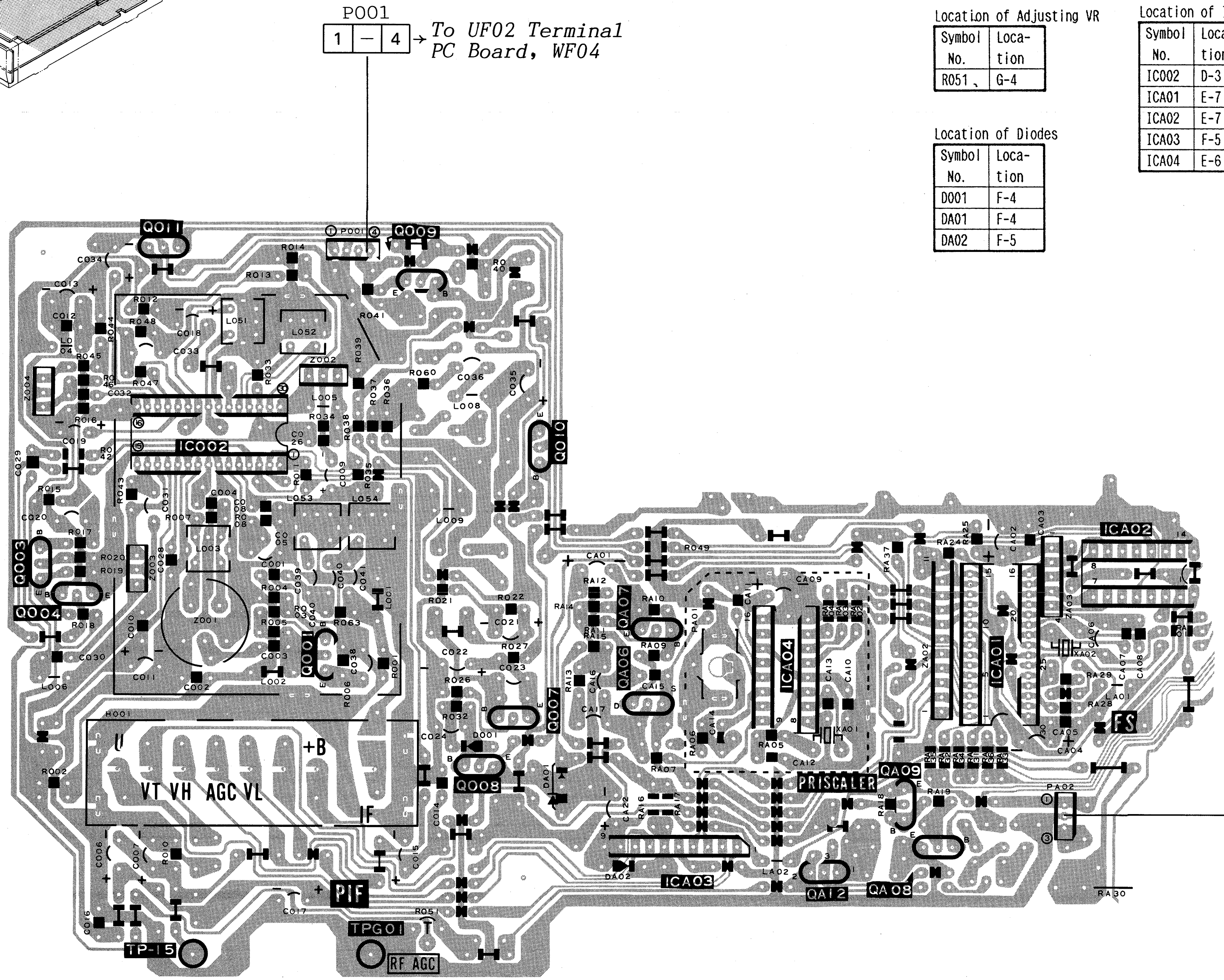
U803 Power 2 PC Board


F801 250V T2A
LINE FILTER
P802
P803
TP811
TP812
TP813
BRN
BLU
C802

U804 Line Filter PC Board (V-93W)

8-3. PIF, Selector PC Board (V-93G)




P001
1 — 4 → To UF02 Terminal PC Board, WF04
Q011
Q009
IC002
Q010
Q003
Q004
Q001
Q008
Q007
QA06
QA07
D001
H001
U
+B
VT VH AGC VL
IF
PIF
TP-15
TPG01
RF AGC
L051
L052
L053
L054
Z001
Z002

ICA01
ICA02
ICA03
ICA04
QA08
QA09
QA12
PRISCALER
FS
PA02

U002 PIF PC Board

PA02
1
2 → To UF02 Terminal PC Board, WF02
3

Voltage and Location of Transistors

Symbol No.	Voltage (Unit:V) E	C	B	Location
Q001	0.7	6.5	1.4	E-3
Q007	6.5	0.5	6.8	F-4
Q008	0	4.5	0.2	F-4
Q009	—	—	—	C-4
QA06	5.0(S)	2.2(D)	1.8(G)	E-5
QA07	0	17.9	0.6	E-5

Location of Adjusting VR

Symbol No.	Location
R051 、	G-4

Location of IC's

Symbol No.	Location
IC002	D-3
ICA01	E-7
ICA02	E-7
ICA03	F-5
ICA04	E-6

Location of Diodes

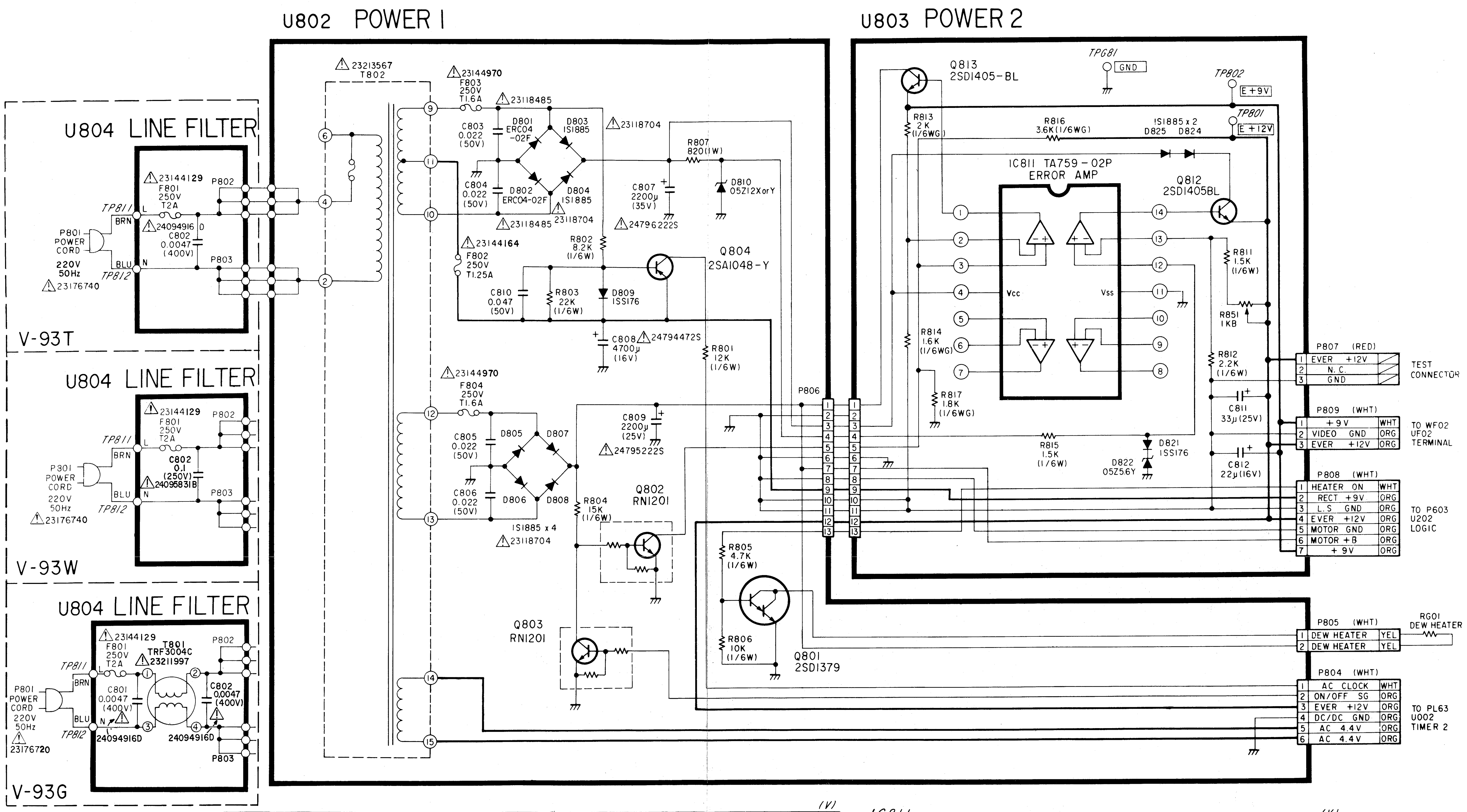
Symbol No.	Location
D001	F-4
DA01	F-4
DA02	F-5

MODE	PIF ON			PIF OFF			Location
Symbol No.	TERMINAL (Unit:V)						
	E	C	B	E	C	B	
QA08	0	0	2.9	0	0	0	F-6
QA09	11.0	11.8	11.9	11.9	0	11.9	F-6

MODE	MUTE ON			MUTE OFF			Location
Symbol No.	TERMINAL (Unit:V)						
	E	C	B	E	C	B	
Q010	0	0.2	0	0	2.0	0	D-4
Q011	0	0	1.4	0	0	2.7	C-3

MODE	IC002 PIN 16: MORE THAN 3.6[V]			IC002 PIN 16: LESS THAN 3.6[V]			Location
Symbol No.	TERMINAL (Unit:V)						
	E	C	B	E	C	B	
Q003	3.6	0	4.4	0.9	0.6	0.4	E-2
Q004	0	5	0	0	0	0.6	E-2

7-3. Power Supply Circuit


U802 POWER 1
U803 POWER 2
U804 LINE FILTER
V-93T
V-93W
V-93G
T802 23213567
F803 250V T1.6A 23144970
F802 250V T1.25A 23144164
F804 250V T1.6A 23144970
D801 ERC04-02F
D802 ERC04-02F
D803 1S1885
D804 1S1885
D805 D806 D807 D808 1S1885 x 4 23118704
C803 0.022 (50V)
C804 0.022 (50V)
C805 0.022 (50V)
C806 0.022 (50V)
C807 2200µ (35V) 24796222S
C808 4700µ (16V) 24794472S
C809 2200µ (25V) 24795222S
C810 0.047 (50V)
R807 820(1W)
D810 05Z12XorY
R802 8.2K (1/6W)
R803 22K (1/6W)
D809 1SS176
Q804 2SA1048-Y
R801 12K (1/6W)
R804 15K (1/6W)
Q802 RN1201
Q803 RN1201
R805 4.7K (1/6W)
R806 10K (1/6W)
Q801 2SD1379
P806
Q813 2SD1405-BL
TPG81 GND
TP802 E+9V
TP801 E+12V
R813 2K (1/6WG)
R816 3.6K(1/6WG)
1S1885 x 2 D825 D824
IC811 TA759-02P ERROR AMP
Vcc
Vss
Q812 2SD1405BL
R811 1.5K (1/6W)
R851 1KB
R812 2.2K (1/6W)
R814 1.6K (1/6WG)
R817 1.8K (1/6WG)
R815 1.5K (1/6W)
D821 1SS176
D822 05Z56Y
C811 33µ(25V)
C812 22µ(16V)
P807 (RED): 1 EVER +12V, 2 N.C., 3 GND — TEST CONNECTOR
P809 (WHT): 1 +9V WHT, 2 VIDEO GND ORG, 3 EVER +12V ORG — TO WF02 UF02 TERMINAL
P808 (WHT): 1 HEATER ON WHT, 2 RECT +9V ORG, 3 L.S GND ORG, 4 EVER +12V ORG, 5 MOTOR GND ORG, 6 MOTOR +B ORG, 7 +9V ORG — TO P603 U202 LOGIC
P805 (WHT): 1 DEW HEATER YEL, 2 DEW HEATER YEL — RG01 DEW HEATER
P804 (WHT): 1 AC CLOCK WHT, 2 ON/OFF SG ORG, 3 EVER +12V ORG, 4 DC/DC GND ORG, 5 AC 4.4V ORG, 6 AC 4.4V ORG — TO PL63 U002 TIMER 2
F801 250V T2A 23144129
C802 0.0047 (400V) 24094916
C802 0.1 (250V) 24095831B
P801 POWER CORD 220V 50Hz 23176740
P301 POWER CORD 220V 50Hz 23176740
P801 POWER CORD 220V 50Hz 23176720
TP811 TP812 BRN BLU L N P802 P803
T801 TRF3004C 23211997
C801 0.0047 (400V)
240949160 240949160

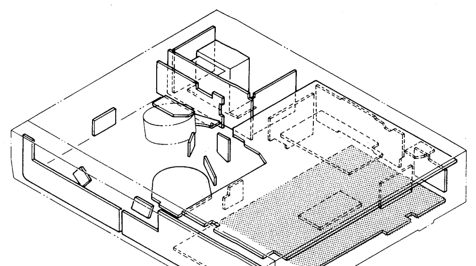
(V)

SYNBOL / TERMINAL / MODE	Q801			Q802			Q803			Q804			Q812			Q813		
	E	C	B	E	C	B	E	C	B	E	C	B	E	C	B	E	C	B
S, BY	0	0.8	1.28	0	0	4.5	0	4.5	0	9,7	1.8	9.7	12,0	18,4	12.6	0	17.5	0
E. E.	0	0.8	1.28	0	4,0	0	0	0	2,0	9,2	1,8	9,2	12,0	18.0	12,6	9.0	16.5	9,6
PLAY	0	15.9	0	0	4.0	0	0	0	2.0	9.0	1,8	9,0	12,0	17,5	12,6	9.0	15.7	9.6
REC	0	15.4	0	0	4,0	0	0	0	2,0	9.0	1.8	9.0	12.0	17,5	12,6	9.0	15,5	9,6

IC811 (V)

TERMINAL / MODE	1	2	3	4	5	6	7	8	9	10	11	12	13	14
S.BY	0	0	0	20.2	0	1.1	0	19,0	6.3	1.1	0	6.3	6.3	12,6
E.E.	9.6	4.0	4.0	19.6	4.0	1.1	0	18.3	6.3	1.1	0	6.3	6.3	12.6
PLAY	9.6	4.0	4.0	19.5	4.0	1.1	0	18.3	6.3	1.1	0	6.3	6.3	12,6
REC	9.6	4.0	4.0	19.4	4.0	1.1	0	18.1	6.3	1.1	0	6.3	6.3	12,6

8-5. PIF, Selector PC Board (V-93T)



Voltage and Location of Transistors

Symbol No.	Voltage (Unit:V)			Location
	E	C	B	
Q001	0.7	6.5	1.4	E-3
Q007	6.6	0.5	6.6	F-4
Q008	0	4.5	0.2	F-4
Q009	—	—	—	C-4
QA06	5.0(S)	2.2(D)	1.8(G)	E-5
QA07	0	17.9	0.6	E-5

MODE	PIF ON			PIF OFF			Location
Symbol No.	TERMINAL (Unit:V)						
	E	C	B	E	C	B	
QA08	0	0	2.9	0	0	0	F-6
QA11	9.0	9.0	8.3	0	0	0	F-7

MODE	MUTE ON			MUTE OFF			Location
Symbol No.	TERMINAL (Unit:V)						
	E	C	B	E	C	B	
Q010	0	0.2	0	0	2.0	0	D-4
Q011	0	0	1.4	0	0	2.7	C-3

Location of Adjusting VR

Symbol No.	Location
R051	G-4

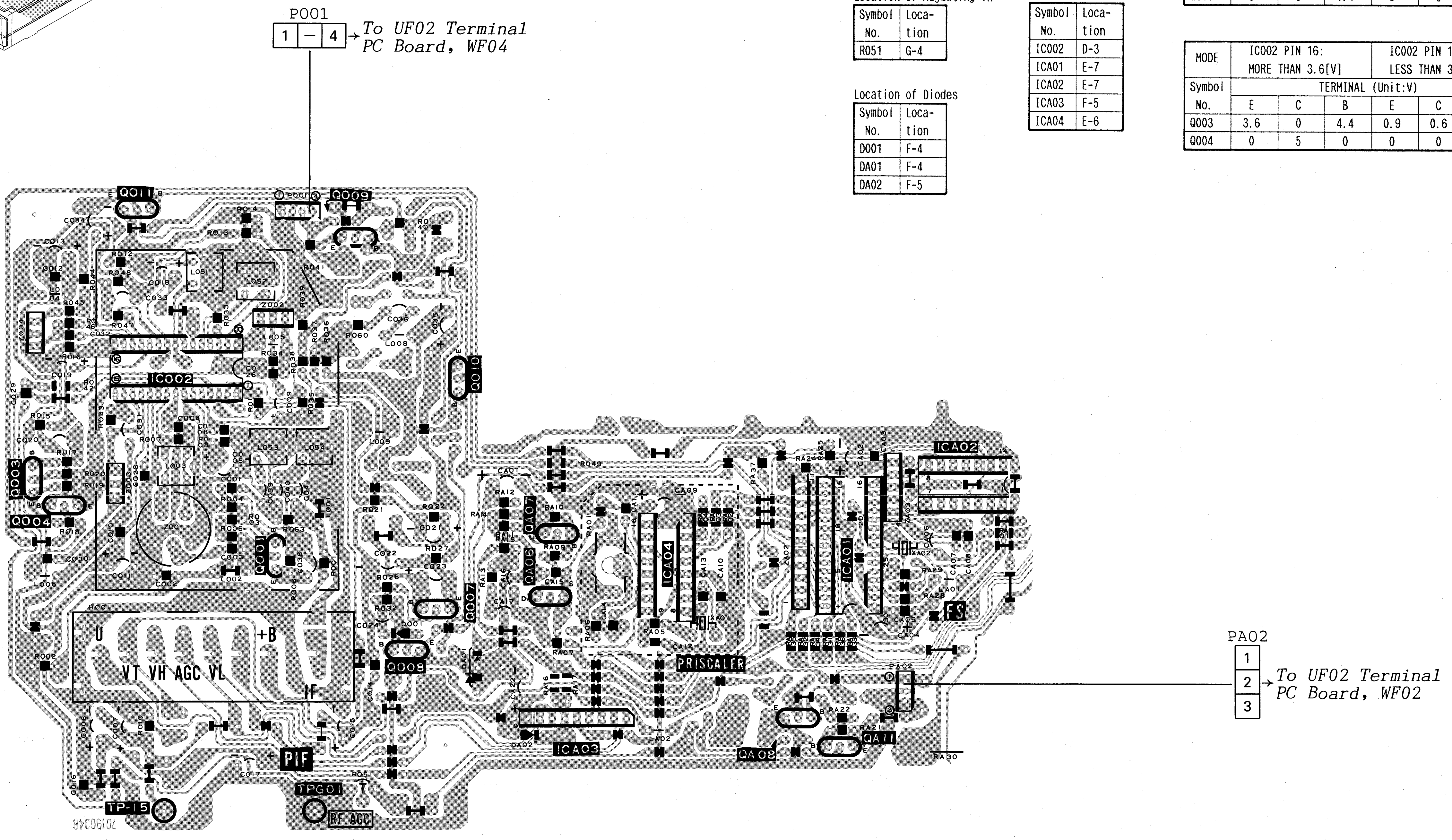
Location of IC's

Symbol No.	Location
IC002	D-3
ICA01	E-7
ICA02	E-7
ICA03	F-5
ICA04	E-6

MODE	IC002 PIN 16: MORE THAN 3.6[V]			IC002 PIN 16: LESS THAN 3.6[V]			Location
Symbol No.	TERMINAL (Unit:V)						
	E	C	B	E	C	B	
Q003	3.6	0	4.4	0.9	0.6	0.4	E-2
Q004	0	5	0	0	0	0.6	E-2

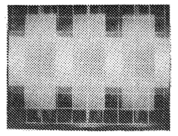
Location of Diodes

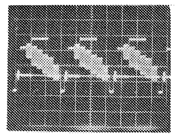
Symbol No.	Location
D001	F-4
DA01	F-4
DA02	F-5

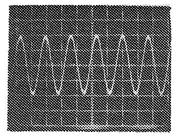

1 2 3 4 5 6 7 8 9 10 11
A B C D E F G
P001
1 — 4
To UF02 Terminal PC Board, WF04
PA02
1
2
3
To UF02 Terminal PC Board, WF02
Q011
Q009
Q010
IC002
Z002
Z004
Z003
Z001
L051
L052
L053
L054
L005
L008
L009
L003
L001
L006
Q001
Q003
Q004
Q007
Q008
QA06
QA07
QA08
QA11
ICA01
ICA02
ICA03
ICA04
ZA02
ZA03
XA01
XA02
LA02
DA01
DA02
D001
PRISCALER
FS
H001
U
+B
VT VH AGC VL
IF
PIF
TP-15
TPG01
RF AGC
R051
R041
R060
R013
R014
R048
R047
R045
R015
R017
R018
R019
R020
R021
R022
R026
R027
R032
R002
R010
R063
R049
RA05
RA06
RA07
RA09
RA10
RA12
RA13
RA14
RA15
RA16
RA17
RA21
RA22
RA24
RA25
RA28
RA29
RA30
RA37
C034
C013
C012
C018
C033
C032
C019
C029
C020
C031
C004
C001
C002
C003
C011
C010
C030
C036
C035
C021
C022
C023
C024
C014
C015
C016
C006
C007
C017
CA01
CA04
CA05
CA06
CA07
CA08
CA09
CA10
CA12
CA13
CA14
CA15
CA16
CA17
CA22
CA02
CA03
7019634G

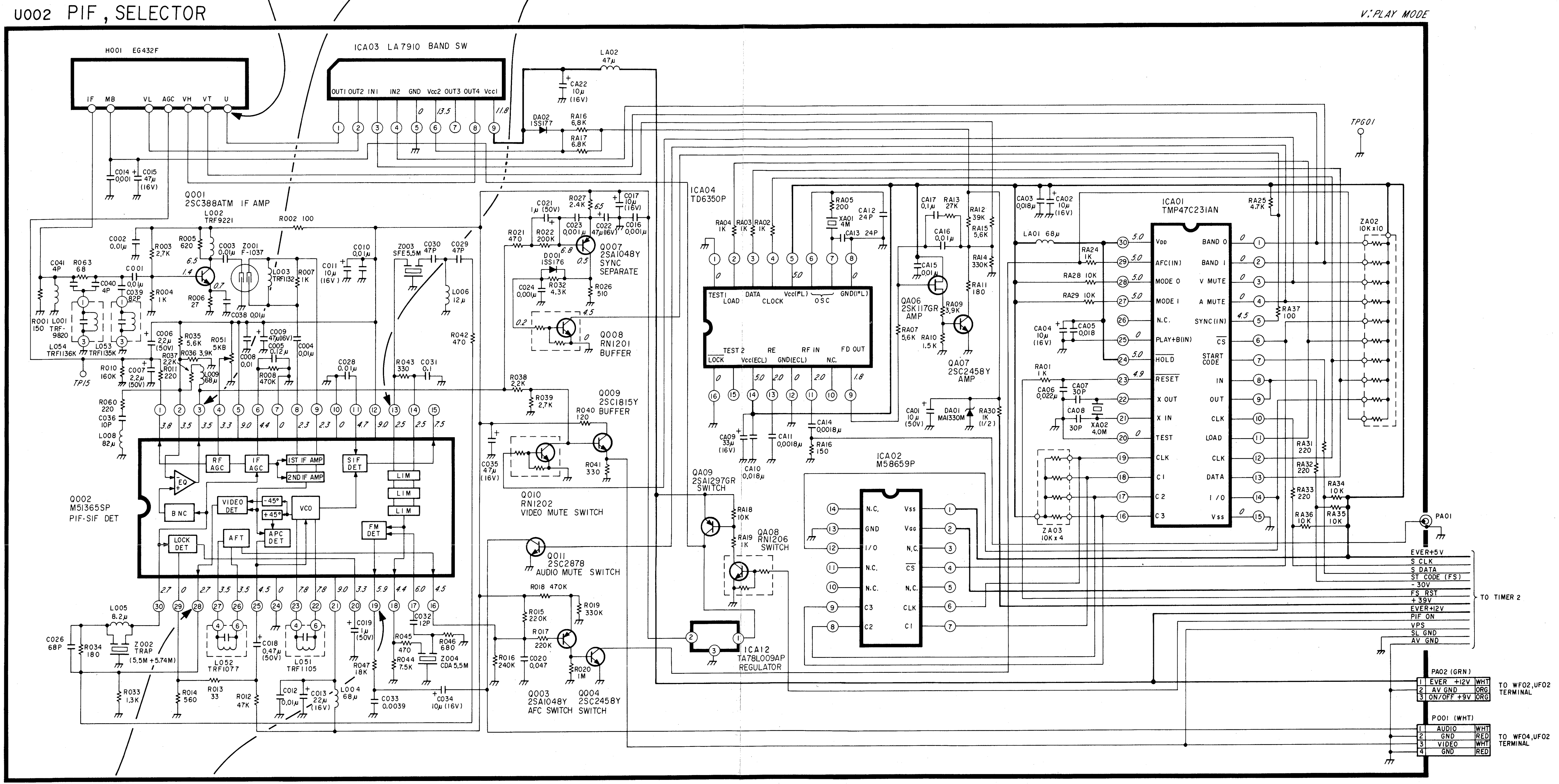
U002 PIF PC Board

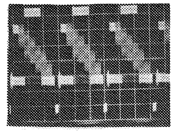
8-4. PIF, Selector Circuit (V-93G)

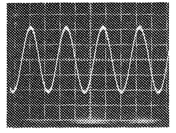

V: 0.1V/div.
H: 20ms/div.


V: 0.5V/div.
H: 20μs/div.


V: 5mV/div.
H: 0.1μs/div.


U002 PIF, SELECTOR
V: PLAY MODE
H001 EG432F
IF MB VL AGC VH VT U
ICA03 LA7910 BAND SW
OUT1 OUT2 IN1 IN2 GND Vcc2 OUT3 OUT4 Vcc1
Q001 2SC388ATM IF AMP
L002 TRF9221
Z001 F-1037
L003 TRF1132
Z003 SFE5.5M
ICA04 TD6350P
TEST1 LOAD DATA CLOCK Vcc(PL) OSC GND(PL)
TEST 2 LOCK Vcc(ECL) RE GND(ECL) RF IN N.C. FD OUT
Q007 2SA1048Y SYNC SEPARATE
Q008 RN1201 BUFFER
Q009 2SC1815Y BUFFER
Q010 RN1202 VIDEO MUTE SWITCH
Q011 2SC2878 AUDIO MUTE SWITCH
Q002 M51365SP PIF-SIF DET
RF AGC
IF AGC
1ST IF AMP
2ND IF AMP
SIF DET
EQ
BNC
VIDEO DET
-45°
+45°
VCO
APC DET
AFT
LOCK DET
FM DET
LIM
L052 TRF1077
L051 TRF1105
Z002 TRAP (5.5M+5.74M)
Z004 CDA5.5M
Q003 2SA1048Y AFC SWITCH
Q004 2SC2458Y SWITCH
QA06 2SK117GR AMP
QA07 2SC2458Y AMP
QA09 2SA1297GR SWITCH
QA08 RN1206 SWITCH
ICA12 TA78L009AP REGULATOR
ICA02 M58659P
N.C. GND I/O N.C. N.C. C3 C2 Vss Vdd N.C. CS N.C. CLK CI
ICA01 TMP47C231AN
VDD AFC(IN) MODE 0 MODE 1 N.C. PLAY+B(IN) HOLD RESET X OUT X IN TEST CLK C1 C2 C3
BAND 0 BAND 1 V MUTE A MUTE SYNC(IN) CS START CODE IN OUT CLK LOAD CLK DATA I/O Vss
XA01 4M
XA02 4.0M
DA01 MA1330M
ZA02 10K×10
ZA03 10K×4
TPG01
PA01
EVER+5V
S CLK
S DATA
ST CODE (FS)
-30V
FS RST
+39V
EVER+12V
PIF ON
VPS
SL GND
AV GND
TO TIMER 2
PA02 (GRN)
1 EVER +12V WHT
2 AV GND ORG
3 ON/OFF +9V ORG
TO WF02, UF02 TERMINAL
P001 (WHT)
1 AUDIO WHT
2 GND RED
3 VIDEO WHT
4 GND RED
TO WF04, UF02 TERMINAL


V: 0.2V/div.
H: 20μs/div.


V: 0.5V/div.
H: 1ms/div.

AFC DETECT (V)

SYNBOL	Q003			Q004		
TERMINAL / MODE	E	C	B	E	C	B
Q002 PIN 16 MORE THAN 3.6(V)	3.6	0	4.4	0	5	0
Q002 PIN 16 LESS THAN 3.6(V)	0.9	0.6	0.4	0	0	0.6

VIDEO·AUDIO MUTE (V)

SYNBOL	Q010			Q011		
TERMINAL / MODE	E	C	B	E	C	B
MUTE OFF	0	2.0	0	0	0	2.7
MUTE ON	0	0.2	0	0	0	1.4

BAND SWITCH (V)

TERMINAL / MODE	ICA01 PIN 1 (ICA03 PIN 3)	ICA01 PIN 2 (ICA03 PIN 4)	ICA03 PIN 2	ICA03 PIN 8	ICA03 PIN 1
VL	H (1.9)	L (0)	12.0	0	0
VH	H (1.9)	H (1.9)	0	12.0	0
U	L (0)	L (0)	0	0	12.0

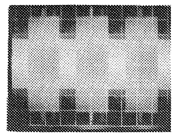
PIF ON/OFF (V)

SYNBOL	QA08			QA09			ICA12		
TERMINAL / MODE	E	C	B	E	C	B	1	2	3
PIF ON	0	0	2.9	11.0	11.8	11.9	11.9	8.9	0
PIF OFF	0	11.9	0	11.9	0	11.9	0	0	0

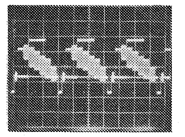
VIDEO·AUDIO MUTE (V)

SYNBOL	ICA01	
TERMINAL / MODE	PIN 3 (VIDEO MUTE)	PIN 4 (AUDIO MUTE)
MUTE OFF	L (0)	L (0)
MUTE ON	H (2.7)	H (2.2)

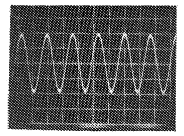
8-6. PIF, Selector Circuit (V-93T)



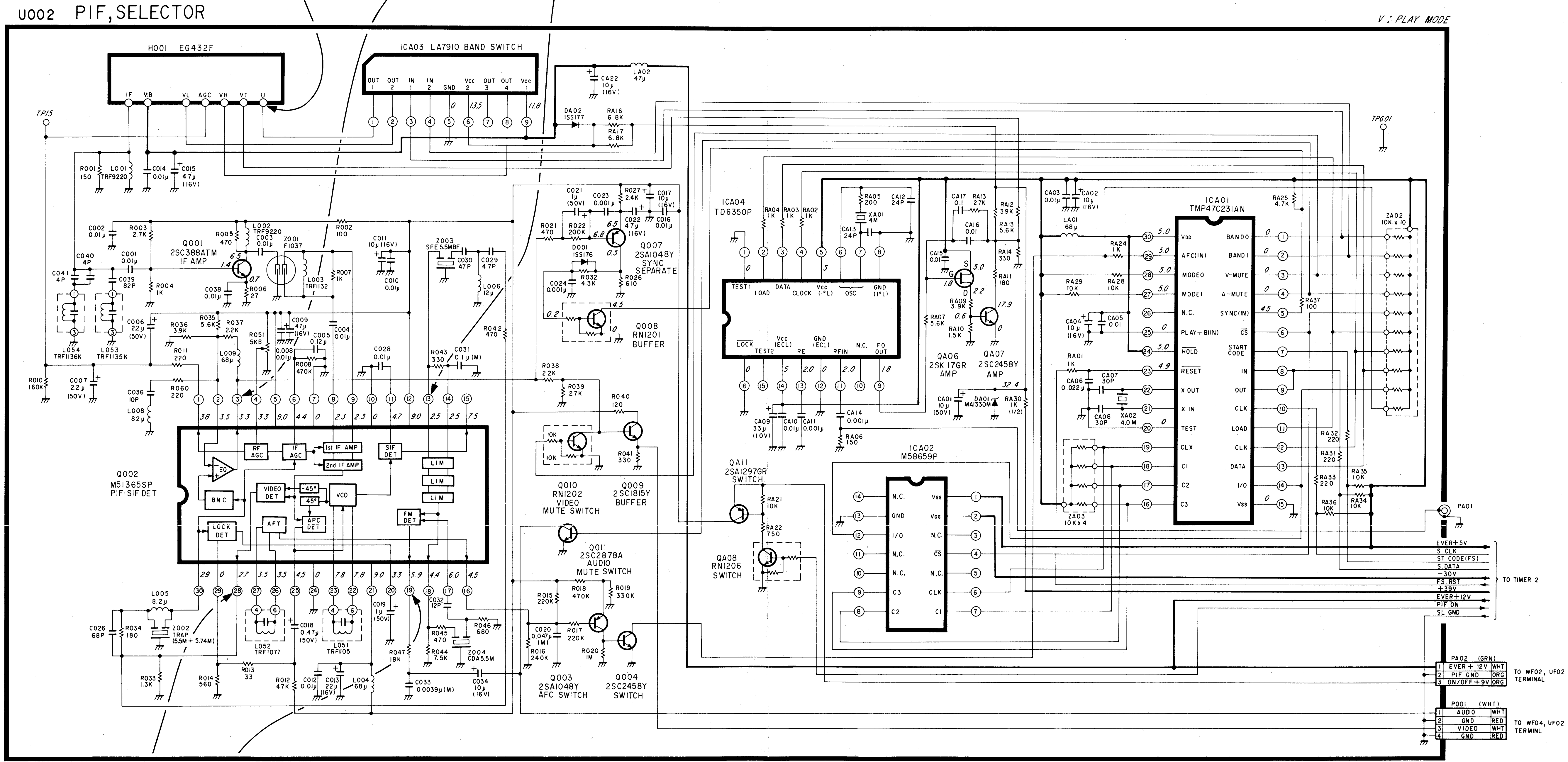
V: 0.1V/div.
H: 20ms/div.

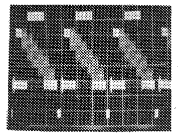


V: 0.5V/div.
H: 20μs/div.

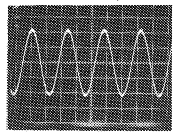


V: 5mV/div.
H: 0.1μs/div.


U002 PIF,SELECTOR
V : PLAY MODE
H001 EG432F
IF MB VL AGC VH VT U
ICA03 LA7910 BAND SWITCH
OUT 1 OUT 2 IN 1 IN 2 GND Vcc 2 OUT 3 OUT 4 Vcc 1
TP15
TPG01
Q001 2SC388ATM IF AMP
Q002 M51365SP PIF·SIF DET
RF AGC
IF AGC
1st IF AMP
2nd IF AMP
SIF DET
EQ
BNC
VIDEO DET
-45°
45°
VCO
APC DET
AFT
LOCK DET
FM DET
LIM
Z001 F1037
Z002 TRAP (5.5M+5.74M)
Z003 SFE5.5MBF
Z004 CDA5.5M
Q007 2SA1048Y SYNC SEPARATE
Q008 RN1201 BUFFER
Q009 2SC1815Y BUFFER
Q010 RN1202 VIDEO MUTE SWITCH
Q011 2SC2878A AUDIO MUTE SWITCH
Q003 2SA1048Y AFC SWITCH
Q004 2SC2458Y SWITCH
ICA04 TD6350P
TEST1 LOAD DATA CLOCK Vcc (1°L) OSC GND (1°L)
LOCK Vcc (ECL) TEST2 RE GND (ECL) RFIN N.C. FO OUT
QA06 2SK117GR AMP
QA07 2SC2458Y AMP
QA11 2SA1297GR SWITCH
QA08 RN1206 SWITCH
ICA02 M58659P
N.C. GND I/O N.C. N.C. C3 C2 Vss Vgg N.C. CS N.C. CLK C1
ICA01 TMP47C231AN
VDD AFC(IN) MODE0 MODE1 N.C. PLAY+B(IN) HOLD RESET X OUT X IN TEST CLK C1 C2 C3
BAND0 BAND1 V-MUTE A-MUTE SYNC(IN) CS START CODE IN OUT CLK LOAD CLK DATA I/O Vss
XA01 4M
XA02 4.0M
ZA02 10K x 10
ZA03 10K x 4
PA01
EVER+5V
S.CLK
ST CODE(FS)
S.DATA
-30V
FS RST
+39V
EVER+12V
PIF ON
SL GND
TO TIMER 2
PA02 (GRN)
1 EVER + 12V WHT
2 PIF GND ORG
3 ON/OFF+9V ORG
TO WF02, UF02 TERMINAL
P001 (WHT)
1 AUDIO WHT
2 GND RED
3 VIDEO WHT
4 GND RED
TO WF04, UF02 TERMINL



V: 0.2V/div.
H: 20μs/div.



V: 0.5V/div.
H: 1ms/div

AFC DETECT (V)

SYNBOL	Q003			Q004		
TERMINAL / MODE	E	C	B	E	C	B
Q002 PIN16 MORE THAN 3.6 (V)	3.6	0	4.4	0	5	0
Q002 PIN16 LESS THAN 3.6 (V)	0.9	0.6	0.4	0	0	0.6

VIDEO · AUDIO MUTE (V)

SYNBOL	Q010			Q011		
TERMINAL / MODE	E	C	B	E	C	B
MUTE OFF	0	2.0	0	0	0	2.7
MUTE ON	0	0.2	0	0	0	1.4

BAND SWITCH (V)

TERMINAL / MODE	ICA01 PIN 2 (ICA03 PIN 3)	ICA01 PIN 2 (ICA03 PIN 4)	ICA03 PIN 2	ICA03 PIN 8	ICA03 PIN 1
VL	H(1.9)	L(0)	12.0	0	0
VH	H(1.9)	H(1.9)	0	12.0	0
U	L(0)	L(0)	0	0	12.0

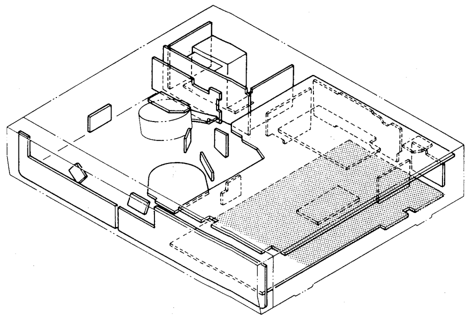
PIF ON / OFF (V)

SYNBOL	QA08			QA11		
TERMINAL / MODE	E	C	B	E	C	B
PIF ON	0	0	2.9	9.0	9.0	8.3
PIF OFF	0	0	0	0	0	0

VIDEO · AUDIO MUTE (V)

SYNBOL	ICA01	
TERMINAL / MODE	PIN3 (VIDEO MUTE)	PIN4 (AUDIO MUTE)
MUTE OFF	L(0)	L(0)
MUTE ON	H(2.7)	H(2.2)

8-7. PIF, Selector PC Board (V-93W)



Voltage and Location of Transistors

Symbol No.	Voltage (Unit:V) E	C	B	Location
Q001	0.7	6.5	1.4	E-3
Q007	6.6	0.5	6.6	F-5
Q008	0	4.5	0.2	F-4
Q009	—	—	—	C-4
QA06	5.0(S)	2.2(D)	1.8(G)	E-5
QA07	0	17.9	0.6	E-5

MODE	PIF ON			PIF OFF			Location
Symbol	TERMINAL (Unit:V)						
No.	E	C	B	E	C	B	
QA08	0	0	2.9	0	0	0	F-6
QA11	9.0	9.0	8.3	0	0	0	F-7

MODE	MUTE ON			MUTE OFF			Location
Symbol	TERMINAL (Unit:V)						
No.	E	C	B	E	C	B	
Q010	0	0.2	0	0	2.0	0	D-5
Q011	0	0	1.4	0	0	2.7	C-3

Location of Adjusting VR

Symbol No.	Location
R051	G-4

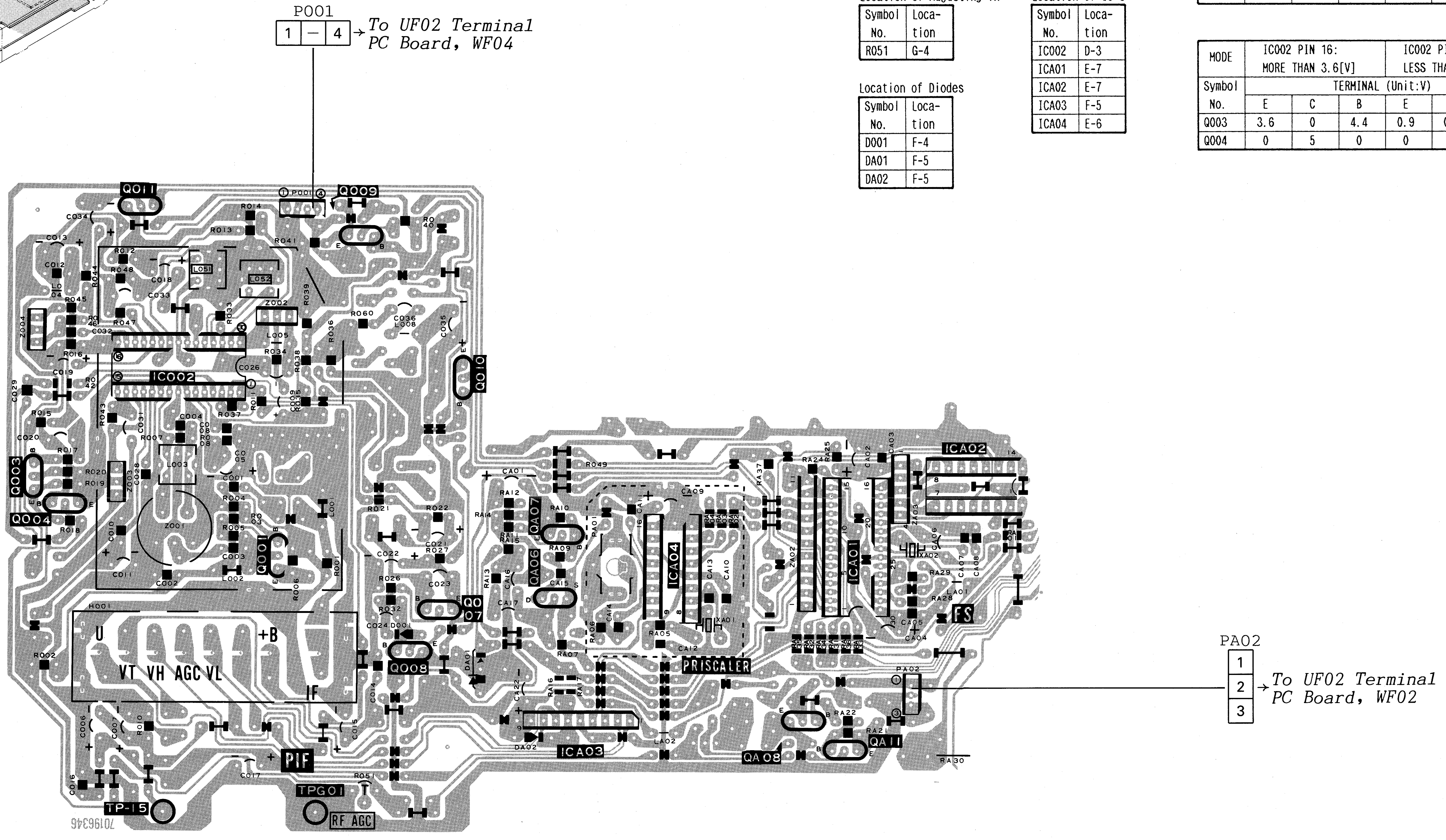
Location of IC's

Symbol No.	Location
IC002	D-3
ICA01	E-7
ICA02	E-7
ICA03	F-5
ICA04	E-6

Location of Diodes

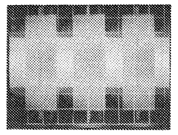
Symbol No.	Location
D001	F-4
DA01	F-5
DA02	F-5

MODE	IC002 PIN 16: MORE THAN 3.6[V]			IC002 PIN 16: LESS THAN 3.6[V]			Location
Symbol	TERMINAL (Unit:V)						
No.	E	C	B	E	C	B	
Q003	3.6	0	4.4	0.9	0.6	0.4	E-2
Q004	0	5	0	0	0	0.6	E-2

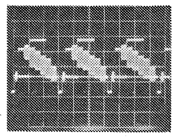

1
2
3
4
5
6
7
8
9
10
11
A
B
C
D
E
F
G
P001
1 — 4
To UF02 Terminal PC Board, WF04
PA02
1
2
3
To UF02 Terminal PC Board, WF02
Q011
Q009
IC002
Q010
Q003
Q004
Q001
Q007
Q008
QA06
QA07
ICA01
ICA02
ICA03
ICA04
QA08
QA11
PRISCALER
FS
PIF
U
+B
VT VH AGC VL
IF
TP-15
TPG01
RF AGC
70196346

U002 PIF PC Board

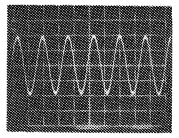
8-8. PIF, Selector Circuit (V-93W)



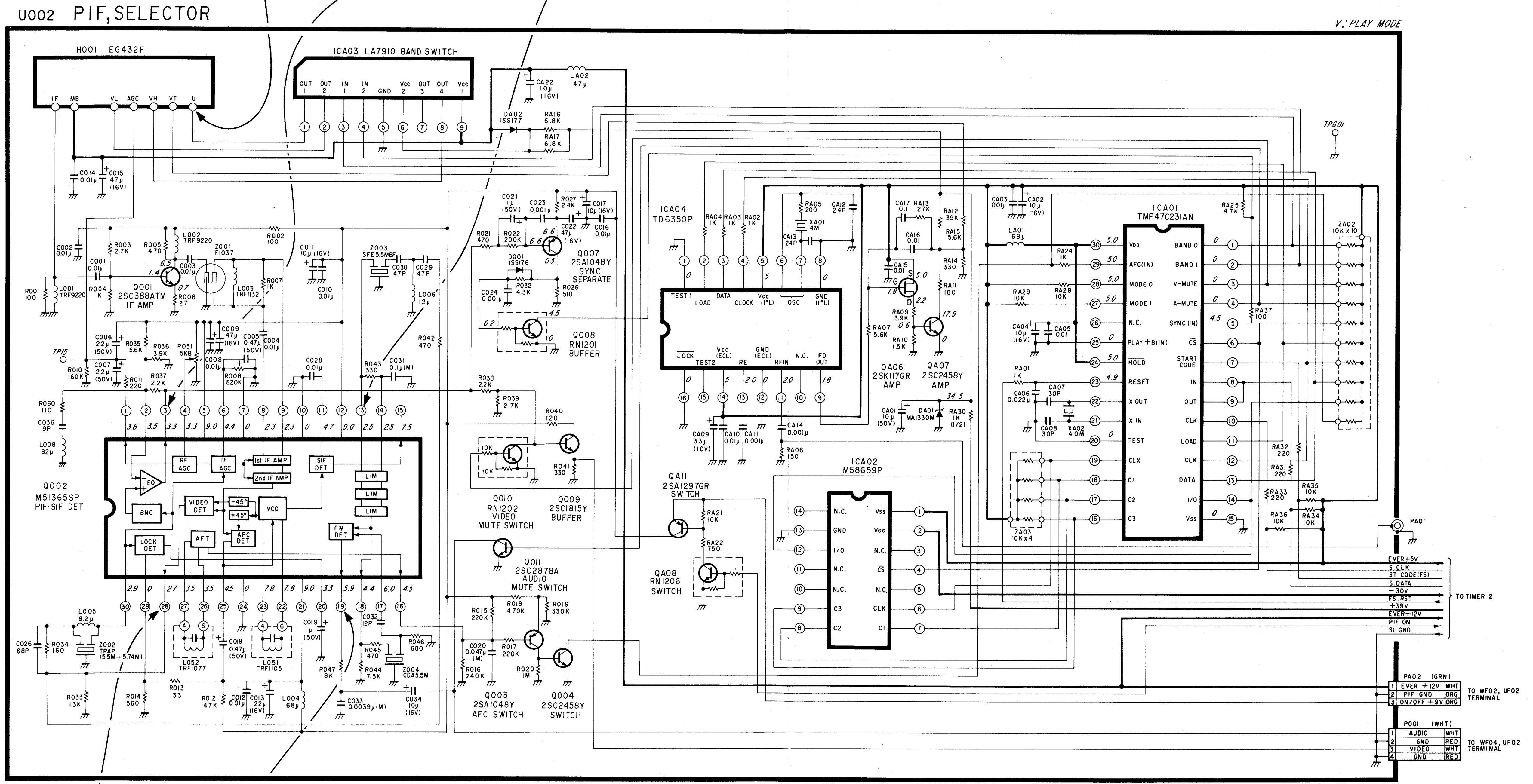
V: 0.1V/div.
H: 20ms/div.

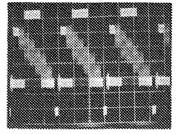


V: 0.5V/div.
H: 20μs/div.

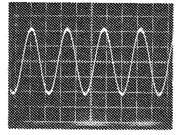


V: 5mV/div.
H: 0.1μs/div.


U002 PIF, SELECTOR
V: PLAY MODE
H001 EG432F
IF MB VL AGC VH VT U
ICA03 LA7910 BAND SWITCH
OUT 1 OUT 2 IN 1 IN 2 GND Vcc 2 OUT 3 OUT 4 Vcc 1
CA22 10μ (16V)
LA02 47μ
DA02 1SS177
RA16 6.8K
RA17 6.8K
C014 0.01μ
C015 47μ (16V)
C002 0.01μ
R003 2.7K
R005 470
L002 TRF9220
Z001 F1037
R002 100
C011 10μ (16V)
Z003 SFE5.5MB
C030 47P
C029 47P
C001 0.01μ
C003 0.01μ
R001 100
L001 TRF9220
R004 1K
Q001 2SC388ATM IF AMP
R006 27
L003 TRF1132
R007 1K
C010 0.01μ
L006 12μ
C021 1μ (50V)
C023 0.001μ
R027 2.4K
C017 10μ (16V)
C016 0.01μ
R021 470
R022 200K
C022 47μ (16V)
Q007 2SA1048Y SYNC SEPARATE
D001 1SS176
R032 4.3K
R026 510
C024 0.001μ
Q008 RN1201 BUFFER
C006 22μ (50V)
R035 5.6K
R036 3.9K
R051 5KB
C009 47μ (16V)
C005 0.47μ (50V)
C004 0.01μ
TP15
C007 22μ (50V)
R010 160K
R011 220
R037 2.2K
C008 0.01μ
R008 820K
C028 0.01μ
R043 330
C031 0.1μ (M)
R042 470
R038 22K
R039 2.7K
R040 120
R041 330
R060 110
C036 9P
L008 82μ
Q002 M51365SP PIF·SIF DET
RF AGC
IF AGC
1st IF AMP
2nd IF AMP
SIF DET
EQ
BNC
VIDEO DET
-45°
+45°
VCO
LIM
LOCK DET
AFT
APC DET
FM DET
Q010 RN1202 VIDEO MUTE SWITCH
Q009 2SC1815Y BUFFER
Q011 2SC2878A AUDIO MUTE SWITCH
L005 8.2μ
C026 68P
R034 160
Z002 TRAP (5.5M+5.74M)
L052 TRF1077
C018 0.47μ (50V)
L051 TRF1105
C019 1μ (50V)
C032 12P
R046 680
R045 470
R044 7.5K
Z004 CDA5.5M
R047 18K
R015 220K
R018 470K
R019 330K
C020 0.047μ (M)
R017 220K
R016 240K
R020 1M
R033 1.3K
R014 560
R013 33
R012 47K
C012 0.01μ
C013 22μ (16V)
L004 68μ
C033 0.0039μ (M)
C034 10μ (16V)
Q003 2SA1048Y AFC SWITCH
Q004 2SC2458Y SWITCH
ICA04 TD6350P
RA04 1K
RA03 1K
RA02 1K
RA05 200
CA12 24P
XA01 4M
CA13 24P
TEST1 LOAD DATA CLOCK Vcc (1*L) OSC GND (1*L)
LOCK TEST2 Vcc (ECL) RE GND (ECL) RFIN N.C. FD OUT
CA09 33μ (10V)
CA10 0.01μ
CA11 0.001μ
CA14 0.001μ
RA06 150
CA17 0.1
RA13 27K
RA12 39K
RA15 5.6K
CA16 0.01
CA15 0.01
RA14 330
RA11 180
RA09 3.9K
RA10 1.5K
RA07 5.6K
QA06 2SK117GR AMP
QA07 2SC2458Y AMP
CA01 10μ (50V)
DA01 MA1330M
RA30 1K (1/2)
QA11 2SA1297GR SWITCH
RA21 10K
RA22 750
QA08 RN1206 SWITCH
ICA02 M58659P
N.C. GND I/O N.C. N.C. C3 C2
Vss Vee N.C. CS N.C. CLK CI
CA03 0.01μ
CA02 10μ (16V)
LA01 68μ
RA24 1K
RA28 10K
RA29 10K
CA04 10μ (16V)
CA05 0.01
RA01 1K
CA06 0.022μ
CA07 30P
CA08 30P
XA02 4.0M
ZA03 10K×4
ICA01 TMP47C231AN
VDD AFC(IN) MODE 0 MODE 1 N.C. PLAY+B(IN) HOLD RESET X OUT X IN TEST CLX CI C2 C3
BAND 0 BAND 1 V-MUTE A-MUTE SYNC (IN) CS START CODE IN OUT CLK LOAD CLK DATA I/O Vss
RA25 4.7K
RA37 100
TPG01
ZA02 10K×10
RA32 220
RA31 220
RA33 220
RA35 10K
RA36 10K
RA34 10K
PA01
EVER+5V
S.CLK
ST CODE(FS)
S.DATA
-30V
FS.RST
+39V
EVER+12V
PIF ON
SL GND
TO TIMER 2
PA02 (GRN)
1 EVER +12V WHT
2 PIF GND ORG
3 ON/OFF +9V ORG
TO WF02, UF02 TERMINAL
P001 (WHT)
1 AUDIO WHT
2 GND RED
3 VIDEO WHT
4 GND RED
TO WF04, UF02 TERMINAL



V: 0.2V/div.
H: 20μs/div.



V: 0.5V/div.
H: 1ms/div.

AFC DETECT (V)

SYNBOL	Q003			Q004		
MODE \ TERMINAL	E	C	B	E	C	B
Q002 PIN16 MORE THAN 3.6(V)	3.6	0	4.4	0	5	0
Q002 PIN16 LESS THAN 3.6(V)	0.9	0.6	0.4	0	0	0.6

VIDEO · AUDIO MUTE (V)

SYNBOL	Q010			Q011		
MODE \ TERMINAL	E	C	B	E	C	B
MUTE OFF	0	2.0	0	0	0	2.7
MUTE ON	0	0.2	0	0	0	1.4

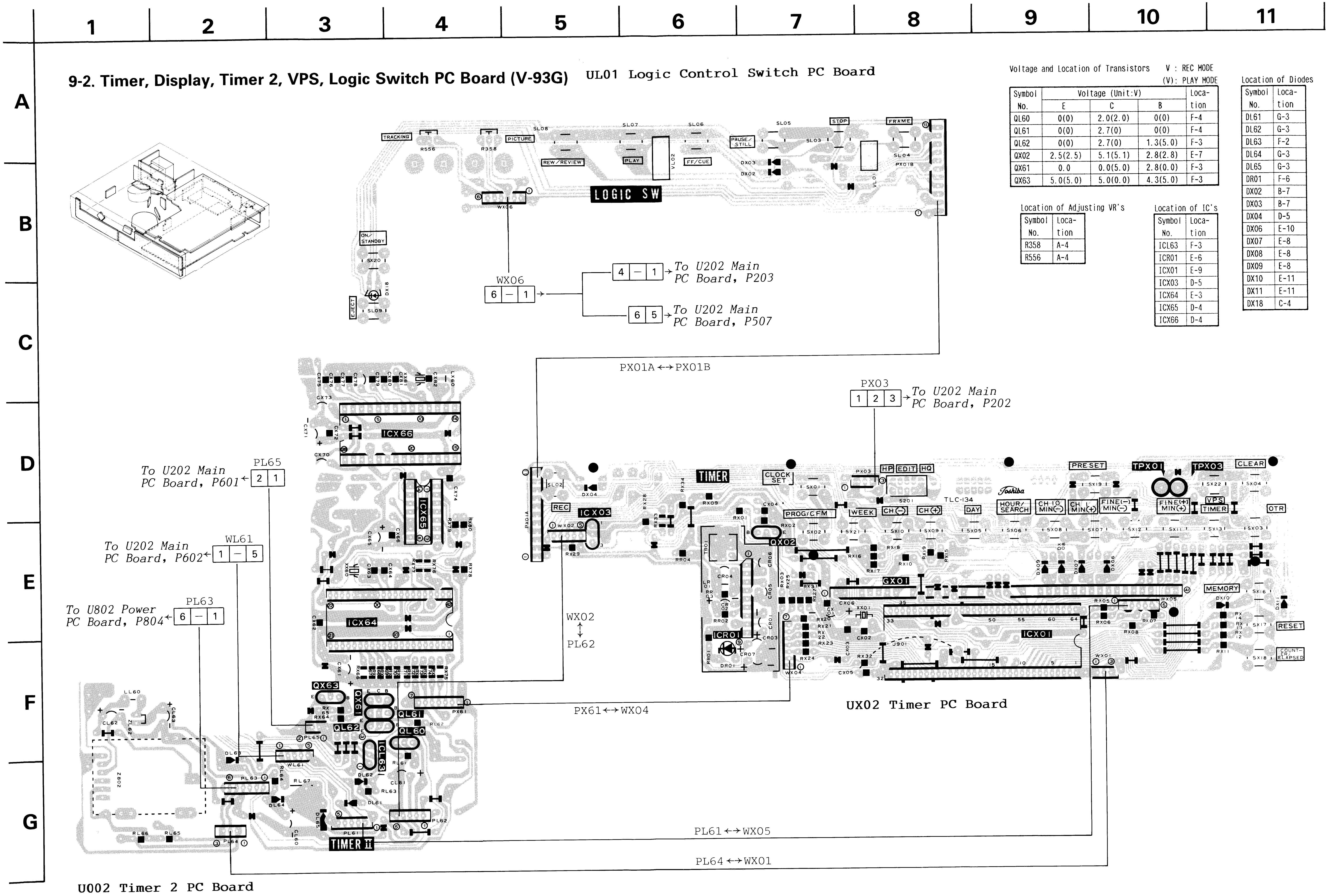
PIF ON / OFF (V)

SYNBOL	QA08			QA11		
MODE \ TERMINAL	E	C	B	E	C	B
PIF ON	0	0	2.9	9.0	9.0	8.3
PIF OFF	0	0	0	0	0	0

VIDEO · AUDIO MUTE (V)

SYNBOL	ICA01	
MODE \ TERMINAL	PIN3 (VIDEO MUTE)	PIN 4 (AUDIO MUTE)
MUTE OFF	L(0)	L(0)
MUTE ON	H(2.7)	H(2.2)

9-2. Timer, Display, Timer 2, VPS, Logic Switch PC Board (V-93G)



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A
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C
D
E
F
G
UL01 Logic Control Switch PC Board
TRACKING
R556
R358
PICTURE
SL08
SL07
SL06
SL05
STOP
FRAME
REW/REVIEW
PLAY
VL02
FF/CUE
PAUSE/STILL
SL03
DX03
DX02
SL04
PX01B
VL01
LOGIC SW
WX06
ON/STANDBY
SX20
DX18
EJECT
SL09
WX06
6 — 1
4 — 1
To U202 Main PC Board, P203
6 5
To U202 Main PC Board, P507
PX01A ←→ PX01B
PX03
1 2 3
To U202 Main PC Board, P202
To U202 Main PC Board, P601
PL65
2 1
To U202 Main PC Board, P602
WL61
1 — 5
To U802 Power PC Board, P804
PL63
6 — 1
ICX66
ICX65
ICX64
CX73
CX71
CX72
CX70
CX74
CX65
CX66
CX64
CX62
CX61
RX79
RX80
RX76
RX77
RX78
XX60
PX01A
SL02
DX04
REC
ICX03
WX02
RX29
TIMER
RX34
RX28
RX33
RX09
RX01
CX04
CLOCK SET
PX03
HP
EDIT
HQ
SX01
S201
TLC-134
Toshiba
PROG/CFM
WEEK
CH(−)
CH(+)
DAY
HOUR/SEARCH
CH 10 MIN(−)
CH 1 MIN(+)
FINE(−) MIN(−)
FINE(+) MIN(+)
PRESET
SX19
TPX01
TPX03
SX22
SX04
CLEAR
VPS TIMER
OTR
SX02
SX21
SX10
SX09
SX05
SX06
SX08
SX07
SX12
SX11
SX13
SX03
QX02
TR01
RR04
CR04
CR06
CR05
CR01
CR02
RR03
RR02
ICR01
RR01
DR01
CR07
CR03
RX02
RX03
RX25
RX16
RX17
RX18
RX10
RX19
RX15
DX09
DX08
DX07
DX06
GX01
CX06
XX01
RX20
RX21
RX22
RX23
RX24
RX27
CX03
CX02
RX32
CX05
J901
ICX01
WX04
RX05
RX06
RX07
RX08
WX05
WX01
MEMORY
DX10
DX11
SX16
SX17
SX18
RX14
RX13
RX12
RX11
RESET
COUNTER ELAPSED
WX02 ↕ PL62
PX61 ←→ WX04
UX02 Timer PC Board
QX63
QX61
QL61
QL62
QL60
ICL63
RX65
RX64
RX66
RX75
PX61
RL62
PL65
WL61
DL63
RL64
PL63
RL67
DL64
DL62
RL61
CL61
RL63
DL61
DL65
PL61
PL62
CL60
PL64
LL60
CL62
CL63
ZL62
Z802
RL66
RL65
TIMER II
PL61 ←→ WX05
PL64 ←→ WX01
U002 Timer 2 PC Board

Voltage and Location of Transistors V : REC MODE
(V): PLAY MODE

Symbol No.	Voltage (Unit:V)			Location
	E	C	B	
QL60	0(0)	2.0(2.0)	0(0)	F-4
QL61	0(0)	2.7(0)	0(0)	F-4
QL62	0(0)	2.7(0)	1.3(5.0)	F-3
QX02	2.5(2.5)	5.1(5.1)	2.8(2.8)	E-7
QX61	0.0	0.0(5.0)	2.8(0.0)	F-3
QX63	5.0(5.0)	5.0(0.0)	4.3(5.0)	F-3

Location of Adjusting VR's

Symbol No.	Location
R358	A-4
R556	A-4

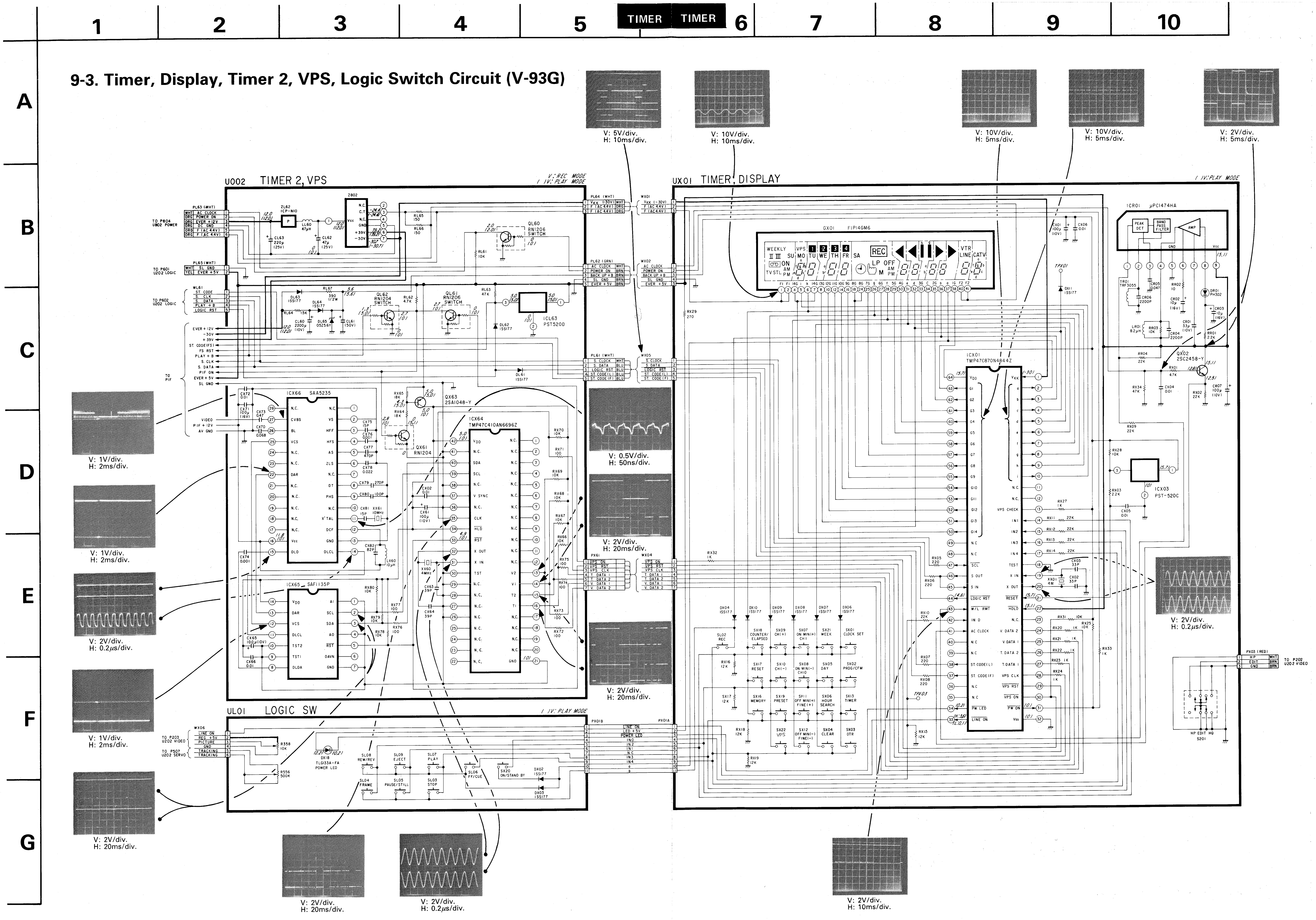
Location of IC's

Symbol No.	Location
ICL63	F-3
ICR01	E-6
ICX01	E-9
ICX03	D-5
ICX64	E-3
ICX65	D-4
ICX66	D-4

Location of Diodes

Symbol No.	Location
DL61	G-3
DL62	G-3
DL63	F-2
DL64	G-3
DL65	G-3
DR01	F-6
DX02	B-7
DX03	B-7
DX04	D-5
DX06	E-10
DX07	E-8
DX08	E-8
DX09	E-8
DX10	E-11
DX11	E-11
DX18	C-4

9-3. Timer, Display, Timer 2, VPS, Logic Switch Circuit (V-93G)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A
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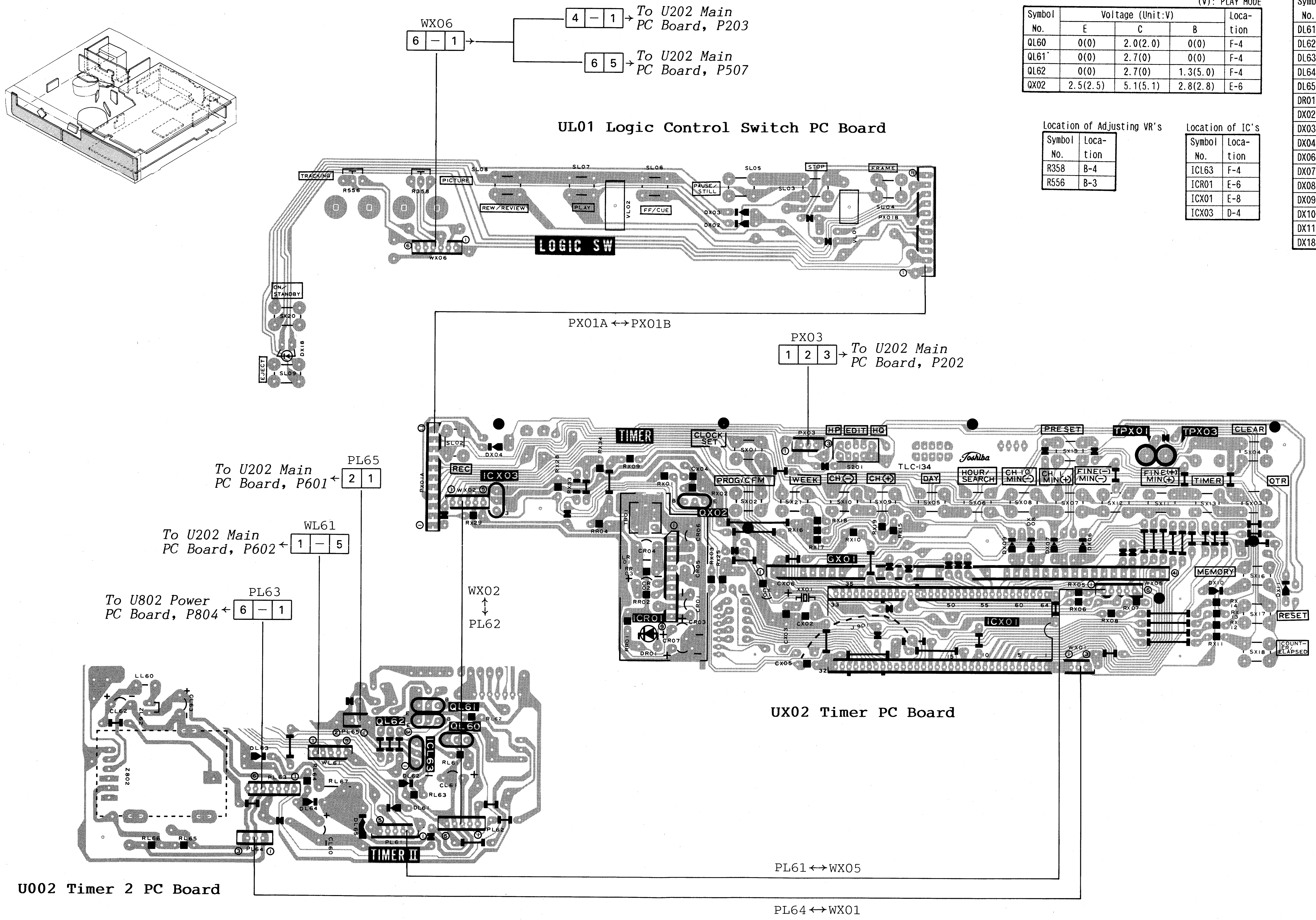
C
D
E
F
G
U002 TIMER 2, VPS
V: REC MODE
( ) V: PLAY MODE
UX01 TIMER, DISPLAY
( ) V: PLAY MODE
UL01 LOGIC SW
( ) V: PLAY MODE
TO P804 U802 POWER
TO P601 U202 LOGIC
TO P602 U202 LOGIC
TO PIF
TO P203 U202 VIDEO
TO P507 U202 SERVO
TO P202 U202 VIDEO
ICX66 SAA5235
ICX65 SAF1135P
ICX64 TMP47C410AN6696Z
ICX01 TMP47C870N4844Z
GX01 FIP14GM6
ICR01 μPC1474HA
ICL63 PST520D
ICX03 PST-520C
QL60 RN1206 SWITCH
QL61 RN1206 SWITCH
QL62 RN1204 SWITCH
QX63 2SA1048-Y
QX61 RN1204
QX02 2SC2458-Y
Z802
ZL62 ICP-N10
DX18 TLG133A-FA POWER LED
HP EDIT HQ S201
SL08 REW/REV
SL09 EJECT
SL07 PLAY
SL06 FF/CUE
SL04 FRAME
SL05 PAUSE/STILL
SL03 STOP
SX20 ON/STAND BY
SL02 REC
SX18 COUNTER/ELAPSED
SX09 CH(+)
SX07 ON MIN(+) CH I
SX21 WEEK
SX01 CLOCK SET
SX17 RESET
SX10 CH(−)
SX08 ON MIN(−) CH O
SX05 DAY
SX02 PROG/CFM
SX16 MEMORY
SX19 PRESET
SX11 OFF MIN(+) FINE(+)
SX06 HOUR SEARCH
SX13 TIMER
SX22 VPS
SX12 OFF MIN(−) FINE(−)
SX04 CLEAR
SX03 OTR
V: 5V/div.
H: 10ms/div.
V: 10V/div.
H: 10ms/div.
V: 10V/div.
H: 5ms/div.
V: 10V/div.
H: 5ms/div.
V: 2V/div.
H: 5ms/div.
V: 1V/div.
H: 2ms/div.
V: 1V/div.
H: 2ms/div.
V: 2V/div.
H: 0.2μs/div.
V: 1V/div.
H: 2ms/div.
V: 2V/div.
H: 20ms/div.
V: 0.5V/div.
H: 50ns/div.
V: 2V/div.
H: 20ms/div.
V: 2V/div.
H: 20ms/div.
V: 2V/div.
H: 0.2μs/div.
V: 2V/div.
H: 20ms/div.
V: 2V/div.
H: 0.2μs/div.
V: 2V/div.
H: 10ms/div.

9-4. Timer, Display, Timer 2, Logic Switch PC Board (V-93T/W)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11
A
B
C
D
E
F
G
WX06
6 — 1
4 — 1 To U202 Main PC Board, P203
6 5 To U202 Main PC Board, P507
UL01 Logic Control Switch PC Board
TRACKING
R556
R358
PICTURE
SL08
SL07
SL06
SL05
STOP
FRAME
REW/REVIEW
PLAY
VL02
FF/CUE
PAUSE/STILL
SL03
DX03
DX02
SL04
PX01B
VL01
LOGIC SW
WX06
ON/STANDBY
SX20
DX18
EJECT
SL09
PX01A ↔ PX01B
PX03
1 2 3 To U202 Main PC Board, P202
TIMER
CLOCK SET
PX03
HP
EDIT
HQ
Toshiba
PRESET
TPX01
TPX03
CLEAR
SL02
DX04
REC
ICX03
PX01A
WX02
RX29
RX28
RX33
RX34
RX09
RX01
PROG/CFM
QX02
RX02
CX04
SX01
SX02
S201
TLC-134
WEEK
CH(−)
CH(+)
DAY
HOUR/SEARCH
CH 10 MIN(−)
CH 1 MIN(+)
FINE(−) MIN(−)
FINE(+) MIN(+)
TIMER
OTR
SX19
SX04
SX21
SX10
SX09
SX05
SX06
SX08
SX07
SX12
SX11
SX13
SX03
RR04
TR01
CR04
CR06
CR05
RX16
RX17
RX18
RX10
RX19
RX15
RX03
RX25
DX09
DX08
DX07
DX06
CX01
CX06
XX01
RX05
WX05
MEMORY
DX10
DX11
SX16
RR02
ICR01
CR01
CR03
CR07
RR01
DR01
CX02
CX03
CX05
J901
ICX01
RX06
RX07
RX08
RX14
RX13
RX12
RX11
SX17
SX18
RESET
COUNTER/ELAPSED
WX01
35
33
50
55
60
64
32
15
10
5
UX02 Timer PC Board
To U202 Main PC Board, P601
PL65
2 1
To U202 Main PC Board, P602
WL61
1 — 5
To U802 Power PC Board, P804
PL63
6 — 1
WX02 ↔ PL62
LL60
CL62
CL63
Z802
DL63
PL63
WL61
RL64
RL67
PL65
QL62
QL61
QL60
RL62
ICL63
RL61
DL62
CL61
RL63
DL64
DL61
DL65
CL60
PL61
PL62
PL64
RL66
RL65
TIMER II
U002 Timer 2 PC Board
PL61 ↔ WX05
PL64 ↔ WX01

Voltage and Location of Transistors V : REC MODE
(V): PLAY MODE

Symbol No.	Voltage (Unit:V)			Location
	E	C	B	
QL60	0(0)	2.0(2.0)	0(0)	F-4
QL61	0(0)	2.7(0)	0(0)	F-4
QL62	0(0)	2.7(0)	1.3(5.0)	F-4
QX02	2.5(2.5)	5.1(5.1)	2.8(2.8)	E-6

Location of Adjusting VR's

Symbol No.	Location
R358	B-4
R556	B-3

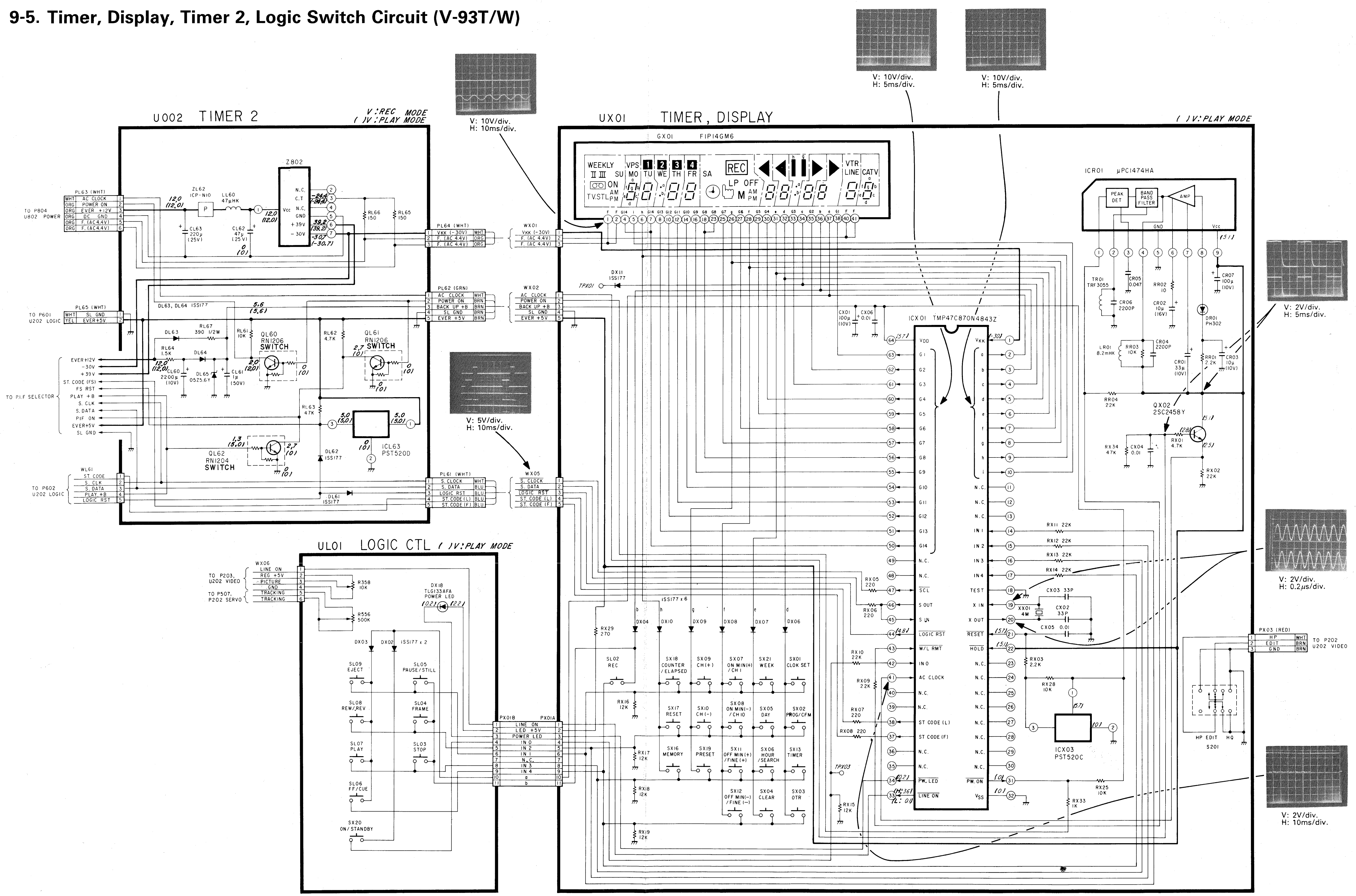
Location of IC's

Symbol No.	Location
ICL63	F-4
ICR01	E-6
ICX01	E-8
ICX03	D-4

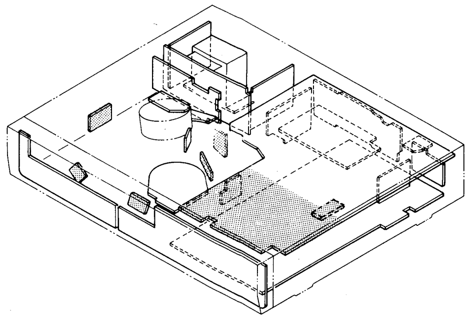
Location of Diodes

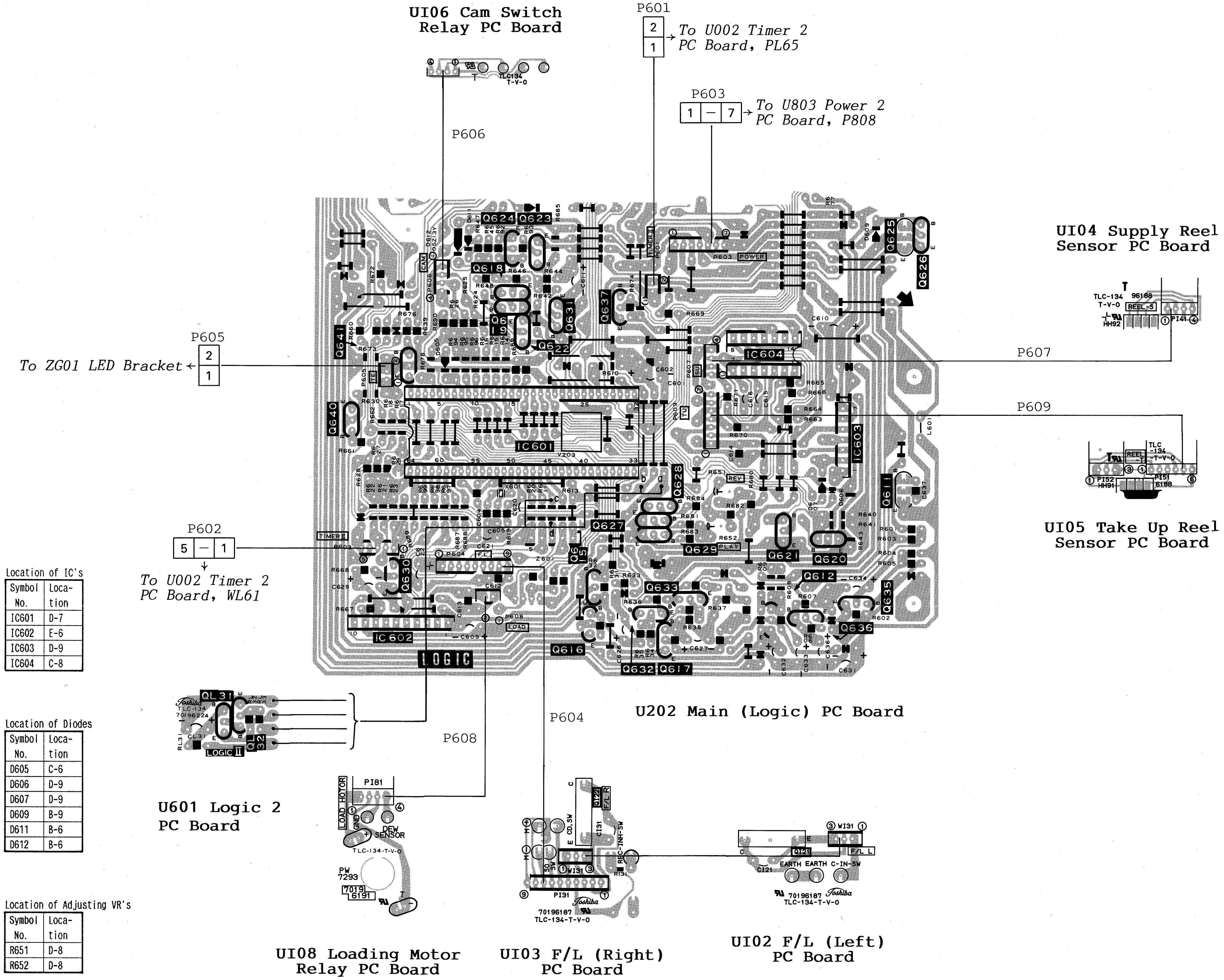
Symbol No.	Location
DL61	G-4
DL62	G-4
DL63	F-3
DL64	G-3
DL65	G-3
DR01	F-6
DX02	B-6
DX03	B-6
DX04	D-4
DX06	E-9
DX07	E-9
DX08	E-8
DX09	E-8
DX10	E-10
DX11	E-10
DX18	C-3

9-5. Timer, Display, Timer 2, Logic Switch Circuit (V-93T/W)


A
B
C
D
E
F
G
U002 TIMER 2
V: REC MODE
( )V: PLAY MODE
V: 10V/div.
H: 10ms/div.
V: 5V/div.
H: 10ms/div.
V: 10V/div.
H: 5ms/div.
V: 10V/div.
H: 5ms/div.
V: 2V/div.
H: 5ms/div.
V: 2V/div.
H: 0.2µs/div.
V: 2V/div.
H: 10ms/div.
UX01 TIMER, DISPLAY
( )V: PLAY MODE
GX01 FIP14GM6
WEEKLY VPS TU WE TH FR SA REC VTR LINE CATV
ON LP OFF AM PM
Z802
ZL62 ICP-N10
LL60 47µHK
CL63 220µ (25V)
CL62 47µ (25V)
RL66 150
RL65 150
PL63 (WHT)
AC CLOCK
POWER ON
EVER +12V
DC GND
F. (AC4.4V)
TO P804 U802 POWER
PL64 (WHT)
VKK (-30V)
WX01
PL62 (GRN)
WX02
BACK UP +B
SL GND
EVER +5V
PL65 (WHT)
TO P601 U202 LOGIC
DL63, DL64 1SS177
RL67 390 1/2W
QL60 RN1206 SWITCH
QL61 RN1206 SWITCH
QL62 RN1204 SWITCH
ICL63 PST520D
DL62 1SS177
DL61 1SS177
TO PI.F SELECTOR
ST. CODE (FS)
FS RST
PLAY +B
S. CLK
S. DATA
PIF ON
EVER+5V
SL GND
WL61
TO P602 U202 LOGIC
PL61 (WHT)
WX05
S. CLOCK
S. DATA
LOGIC RST
ST. CODE (L)
ST. CODE (F)
UL01 LOGIC CTL ( )V: PLAY MODE
WX06
LINE ON
REG +5V
PICTURE
GND
TRACKING
TO P203, U202 VIDEO
TO P507, P202 SERVO
R358 10K
R556 500K
DX18 TLG133AFA POWER LED
DX03 DX02 1SS177 x 2
SL09 EJECT
SL05 PAUSE/STILL
SL08 REW/REV
SL04 FRAME
SL07 PLAY
SL03 STOP
SL06 FF/CUE
SX20 ON/STANDBY
PX01B PX01A
LED +5V
POWER LED
IN 0
IN 1
IN 2
IN 3
IN 4
N.C.
DX11 1SS177
TPX01
1SS177 x 6
DX04 DX10 DX09 DX08 DX07 DX06
RX29 270
SL02 REC
SX18 COUNTER /ELAPSED
SX09 CH (+)
SX07 ON MIN(+) /CH I
SX21 WEEK
SX01 CLOK SET
SX17 RESET
SX10 CH (-)
SX08 ON MIN(-) /CH 10
SX05 DAY
SX02 PROG/CFM
SX16 MEMORY
SX19 PRESET
SX11 OFF MIN(+) /FINE(+)
SX06 HOUR /SEARCH
SX13 TIMER
SX12 OFF MIN(-) /FINE(-)
SX04 CLEAR
SX03 OTR
RX16 12K
RX17 12K
RX18 12K
RX19 12K
TPX03
RX15 12K
CX01 100µ (10V)
CX06 0.01
ICX01 TMP47C870N4843Z
VDD VKK
G1 G2 G3 G4 G5 G6 G7 G8 G9 G10 G11 G12 G13 G14
SCL
S OUT
S IN
LOGIC RST
W/L RMT
IN 0
AC CLOCK
ST CODE (L)
ST CODE (F)
PW. LED
LINE ON
TEST
X IN
X OUT
RESET
HOLD
PW. ON
VSS
RX11 22K
RX12 22K
RX13 22K
RX14 22K
RX05 220
RX06 220
RX10 22K
RX09 22K
RX07 220
RX08 220
CX03 33P
XX01 4M
CX02 33P
CX05 0.01
RX03 2.2K
RX28 10K
ICX03 PST520C
RX33 1K
RX25 10K
ICR01 µPC1474HA
PEAK DET
BAND PASS FILTER
AMP
GND
Vcc
TR01 TRF3055
CR05 0.047
CR06 2200P
RR02 10
CR02 10µ (16V)
CR07 100µ (10V)
DR01 PH302
LR01 8.2mHK
RR03 10K
CR04 2200P
CR01 33µ (10V)
RR01 2.2K
CR03 10µ (10V)
RR04 22K
QX02 2SC2458Y
RX34 47K
CX04 0.01
RX01 4.7K
RX02 22K
PX03 (RED)
HP
EDIT
TO P202 U202 VIDEO
HP EDIT HQ
S201

10-2. Logic PC Board




UI06 Cam Switch Relay PC Board
P601
To U002 Timer 2 PC Board, PL65
P603
To U803 Power 2 PC Board, P808
P606
P605
To ZG01 LED Bracket
P602
To U002 Timer 2 PC Board, WL61
UI04 Supply Reel Sensor PC Board
P607
P609
UI05 Take Up Reel Sensor PC Board
U202 Main (Logic) PC Board
P604
P608
LOGIC
U601 Logic 2 PC Board
UI08 Loading Motor Relay PC Board
UI03 F/L (Right) PC Board
UI02 F/L (Left) PC Board
IC601
IC602
IC603
IC604
Q611
Q612
Q616
Q617
Q618
Q619
Q620
Q621
Q622
Q623
Q624
Q625
Q626
Q627
Q628
Q629
Q630
Q631
Q632
Q633
Q635
Q636
Q637
Q640
Q641
QL31
QL32
QI21
QI22
DEW SENSOR
LOAD MOTOR
EARTH
C-IN-SW
REC-INH-SW
CD.SW
TLC-134-T-V-0

Voltage and Location of Transistors

Symbol No.	Voltage (Unit:V)			Location
	E	C	B	
Q611	5.1	9.6(9.4)	6.3	D-9
Q612	5.1	5.1	5.8	E-9
Q615	5.1	4.9(0.3)	4.4(5.1)	E-7
Q616	0(9.0)	9.1	0(9.8)	E-7
Q617	5.1(0)	5.1	5.8(0)	E-8
Q618	0	3.9	0	C-6
Q619	0	3.9	0	C-6
Q620	0	0.5	0.1	E-9
Q621	0	0.1	2.7	E-8
Q622	0	0	2.7	C-7
Q623	0	16.7	0	B-7
Q624	16.8(16.2)	8.5	16.8(16.2)	B-6
Q625	16.4(15.8)	3.4	15.8(15.2)	B-9
Q626	3.4	15.8(15.2)	3.9	C-9
Q627	0	0	2.8	D-7
Q628	0	0.5	0	D-8
Q629	0	0	2.8	E-8
Q630	0	9.1	0	E-6
Q631	0	3.0	1.6	C-7
Q632	12.0	0(11.9)	12.0(1.1)	E-7
Q633	9.1	9.1(0)	1.8(9.1)	E-7
Q635	4.3	6.3	4.9	E-9
Q636	4.3	12.0	4.9	E-9
Q637	0	—	—	C-7
Q640	4.4(0)	5.1	5.1(0)	D-5
Q641	—	0	—	C-5
QI21				G-8
QI22				F-7
QL31				
QL32				

Location of IC's

Symbol No.	Location
IC601	D-7
IC602	E-6
IC603	D-9
IC604	C-8

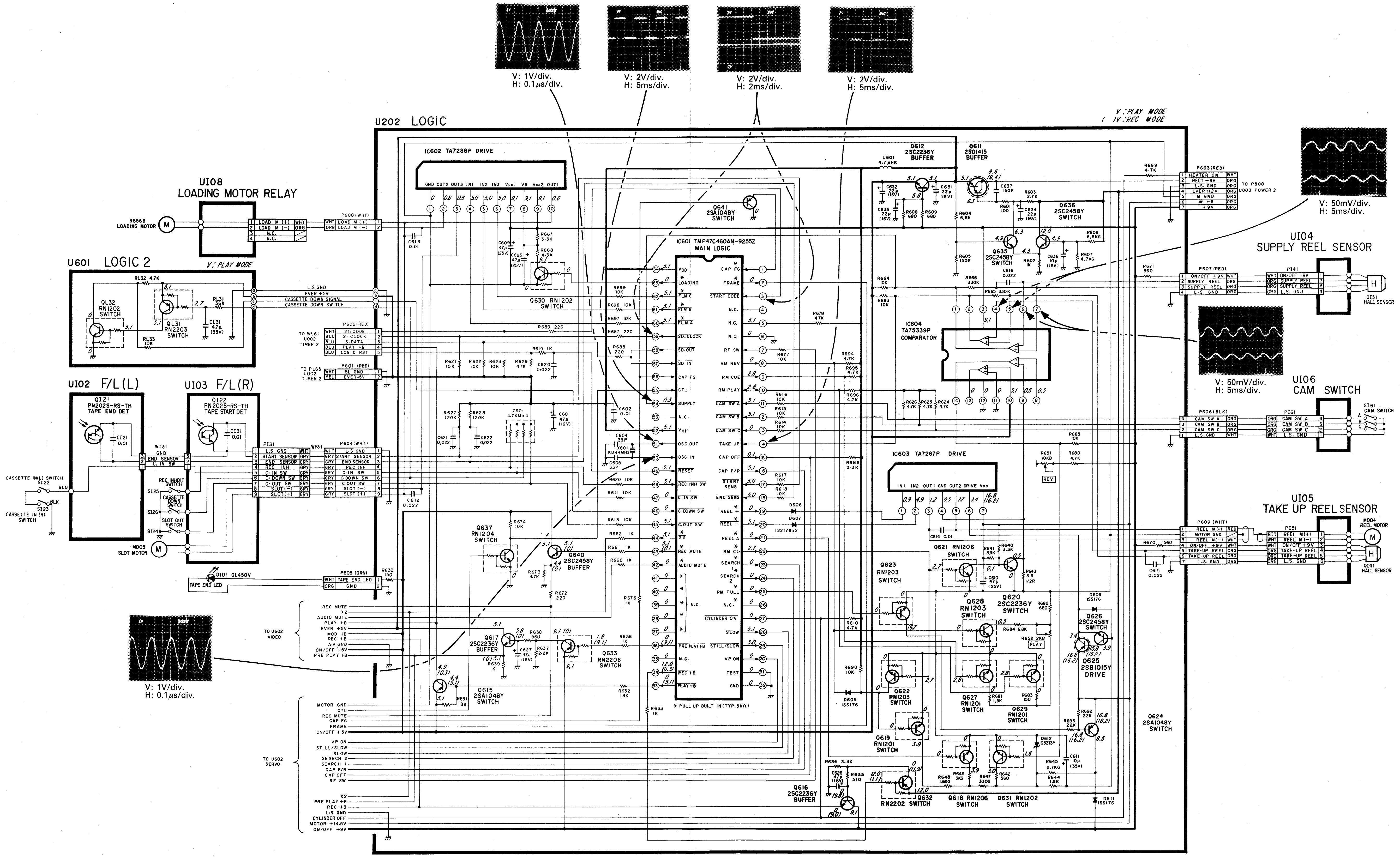
Location of Diodes

Symbol No.	Location
D605	C-6
D606	D-9
D607	D-9
D609	B-9
D611	B-6
D612	B-6

Location of Adjusting VR's

Symbol No.	Location
R651	D-8
R652	D-8

10-3. Logic Circuit

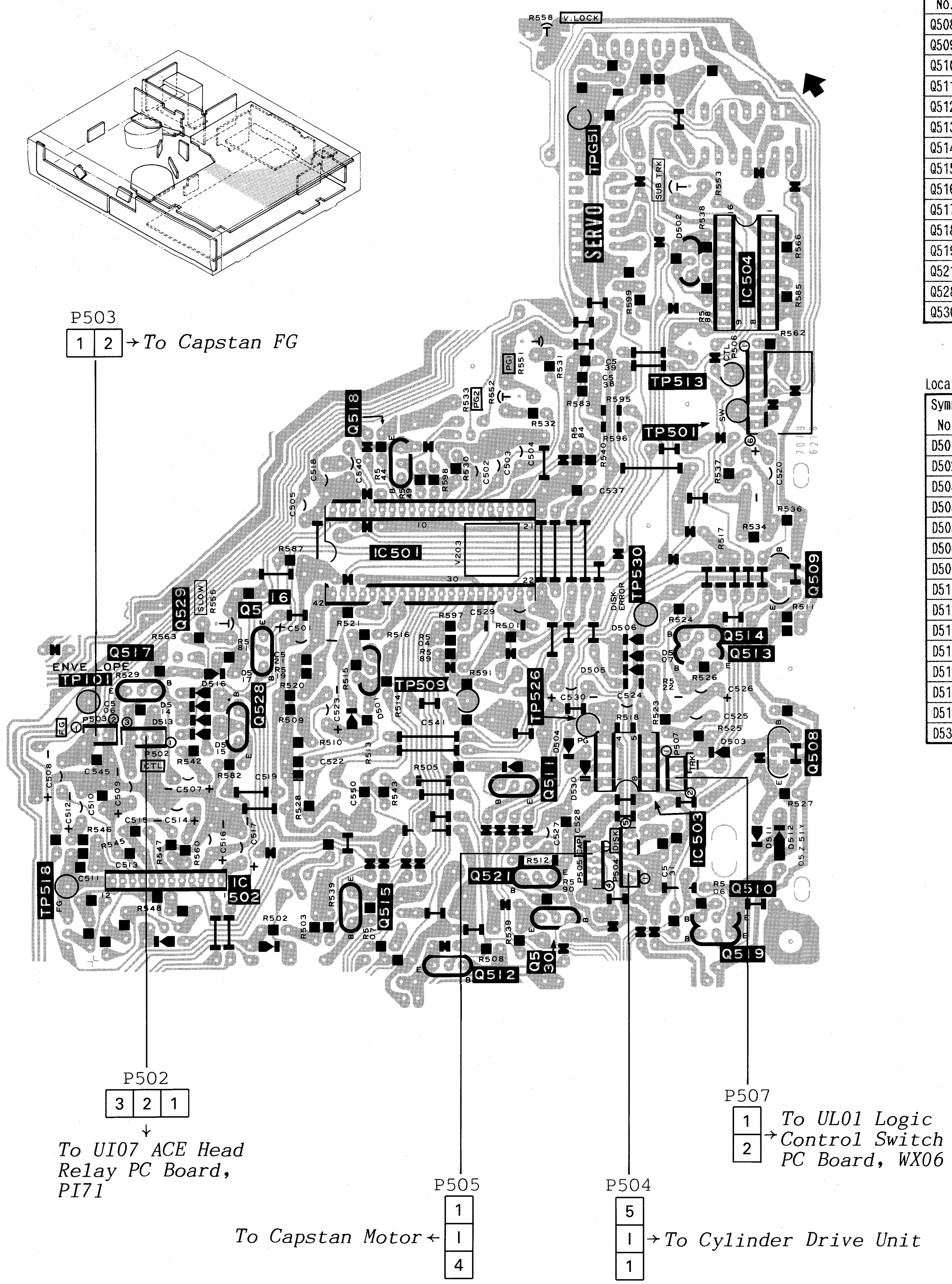

V: 1V/div.
H: 0.1μs/div.
V: 2V/div.
H: 5ms/div.
V: 2V/div.
H: 2ms/div.
V: 2V/div.
H: 5ms/div.
U202 LOGIC
V : PLAY MODE
( )V : REC MODE
IC602 TA7288P DRIVE
U108
LOADING MOTOR RELAY
B5568
LOADING MOTOR
P608 (WHT)
U601 LOGIC 2
V : PLAY MODE
QL32
RN1202
SWITCH
QL31
RN2203
SWITCH
U102 F/L(L)
Q121
PN202S-RS-TH
TAPE END DET
U103 F/L(R)
Q122
PN202S-RS-TH
TAPE START DET
CASSETTE IN(L) SWITCH
S122
CASSETTE IN (R) SWITCH
S123
REC INHIBIT SWITCH
CASSETTE DOWN SWITCH
SLOT OUT SWITCH
S125
S126
S124
M005
SLOT MOTOR
D101 GL450V
TAPE END LED
P604 (WHT)
P602 (RED)
P601 (RED)
P605 (GRN)
TO WL61
U002
TIMER 2
TO PL65
U002
TIMER 2
Q641
2SA1048Y
SWITCH
Q630 RN1202
SWITCH
IC601 TMP47C460AN-9255Z
MAIN LOGIC
Q637
RN1204
SWITCH
Q640
2SC2458Y
BUFFER
Q617
2SC2236Y
BUFFER
Q633
RN2206
SWITCH
Q615
2SA1048Y
SWITCH
TO U602
VIDEO
TO U602
SERVO
* PULL UP BUILT IN(TYP.5KΩ)
Q612
2SC2236Y
BUFFER
Q611
2SD1415
BUFFER
Q636
2SC2458Y
SWITCH
Q635
2SC2458Y
SWITCH
IC604
TA75339P
COMPARATOR
IC603 TA7267P DRIVE
P603 (RED)
TO P808
U803 POWER 2
V: 50mV/div.
H: 5ms/div.
U104
SUPPLY REEL SENSOR
P607 (RED)
P141
Q151
HALL SENSOR
V: 50mV/div.
H: 5ms/div.
U106
CAM SWITCH
P606 (BLK)
P161
S161
CAM SWITCH
U105
TAKE UP REEL SENSOR
P609 (WHT)
P151
M004
REEL MOTOR
Q141
HALL SENSOR
Q621 RN1206
SWITCH
Q623
RN1203
SWITCH
Q628
RN1203
SWITCH
Q620
2SC2236Y
SWITCH
Q626
2SC2458Y
SWITCH
Q625
2SB1015Y
DRIVE
Q622
RN1203
SWITCH
Q627
RN1201
SWITCH
Q629
RN1201
SWITCH
Q624
2SA1048Y
SWITCH
Q619
RN1201
SWITCH
Q616
2SC2236Y
BUFFER
Q632
RN2202 SWITCH
Q618 RN1206
SWITCH
Q631 RN1202
SWITCH
V: 1V/div.
H: 0.1μs/div.

1 2 3 4 5 6 7 8 9 10 11

A B C D E F G

11-2. Servo PC Board

U202 Main (Servo) PC Board


SERVO
IC501
IC502
IC503
IC504
TP501
TP509
TP513
TP518
TP526
TP530
TPG51
TP101
ENVE LOPE
SUB TRK
V.LOCK
SLOW
CTL
DISK ERROR
Q508
Q509
Q510
Q511
Q512
Q513
Q514
Q515
Q517
Q518
Q519
Q521
Q528
Q529
Q530
P503
1 2 → To Capstan FG
P502
3 2 1
To UI07 ACE Head Relay PC Board, PI71
P505
1 I 4
To Capstan Motor
P504
5 I 1
→ To Cylinder Drive Unit
P507
1 2
→ To UL01 Logic Control Switch PC Board, WX06

Voltage and Location of Transistors

Symbol No.	Voltage (Unit:V)			Location
	E	C	B	
Q508	2.00(1.97)	16.82(17.47)	3.24(3.15)	E-5
Q509	5.34(5.26)	16.84(17.40)	6.60(6.51)	D-5
Q510	0(0)	3.24(3.14)	0.06(0.06)	E-5
Q511	0(0)	0.02(0.02)	0(0)	E-3
Q512	5.07(5.06)	0(0)	5.07(5.06)	F-3
Q513	2.58(2.54)	1.30(0.65)	2.54(2.50)	D-4
Q514	0(0)	2.57(2.50)	0(0)	D-4
Q515	5.07(5.06)	0(0)	5.06(5.06)	F-3
Q516	0(0)	4.49(4.49)	0(0)	D-2
Q517	0(0)	0.57(0.56)	0(0)	D-1
Q518	0(0)	2.35(2.35)	2.08(2.08)	C-2
Q519	0(0)	1.74(1.76)	0(0)	F-4
Q521	5.27(5.33)	0.03(0.03)	6.46(6.53)	E-3
Q528	5.06(5.06)	0(0)	5.07(5.07)	E-2
Q530	0(0)	6.47(6.54)	0.02(0.03)	F-3

Location of Diodes

Symbol No.	Location
D501	E-3
D502	B-4
D503	E-4
D504	E-3
D505	D-4
D506	D-4
D507	D-4
D511	E-5
D512	E-5
D513	E-2
D514	E-2
D515	E-2
D516	D-2
D517	D-2
D530	E-4

Location of Adjusting VR's

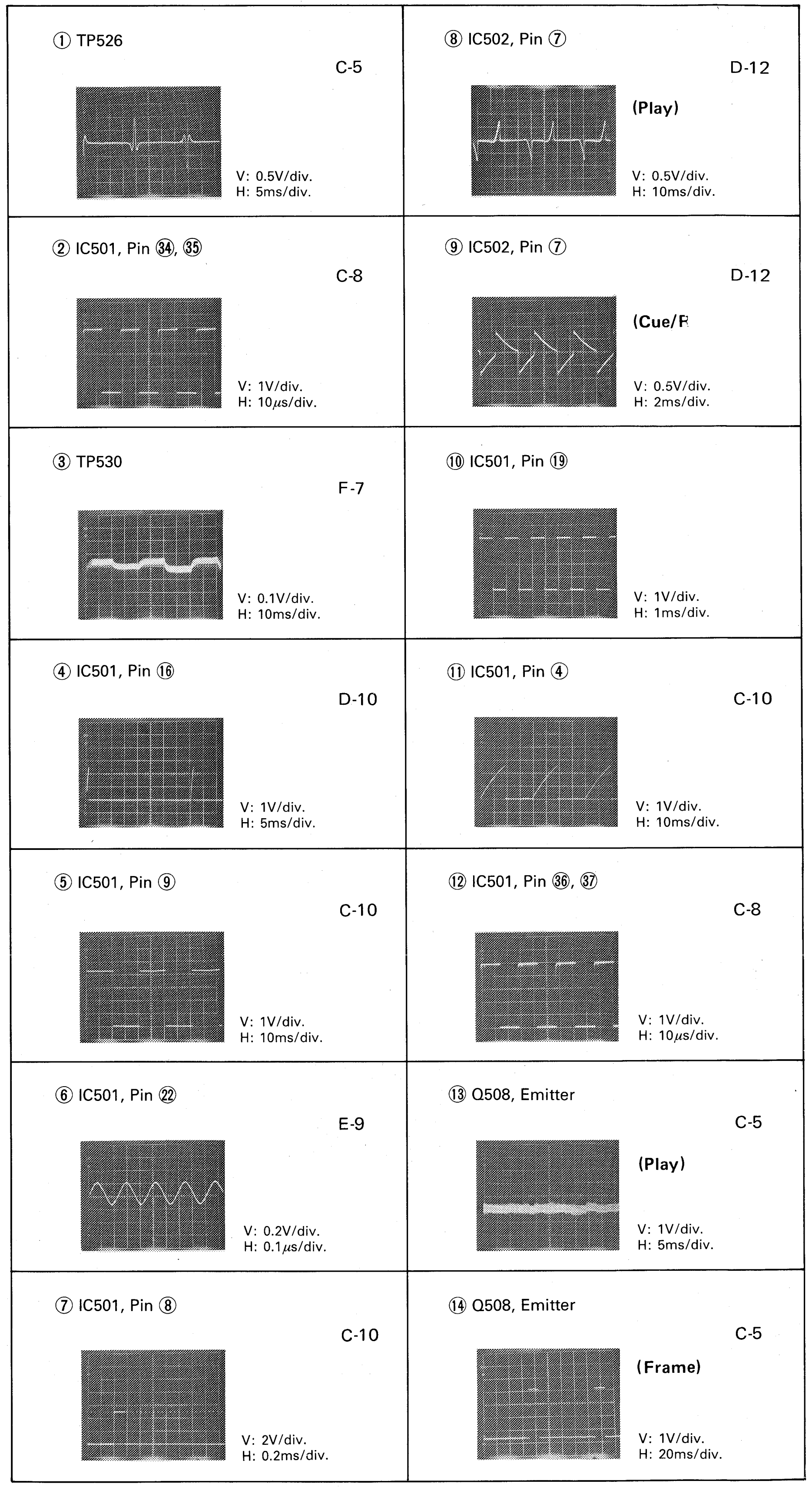
Symbol No.	Location
R551	C-3
R552	C-3
R553	B-4
R555	D-2
R558	A-3

Location of IC's

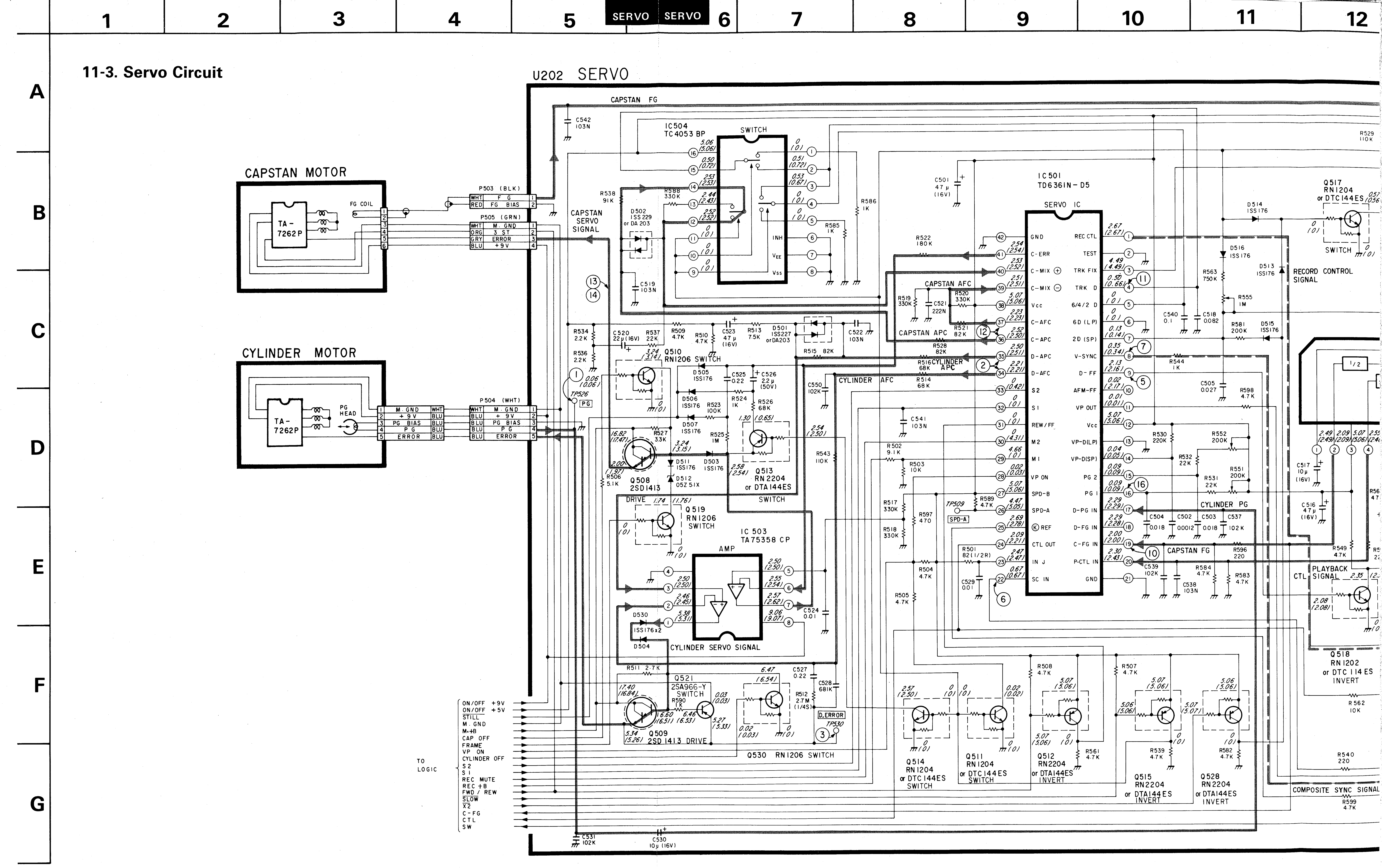
Symbol No.	Location
IC501	D-3
IC502	E-2
IC503	E-4
IC504	B-5

Cylinder Servo

Capstan Servo

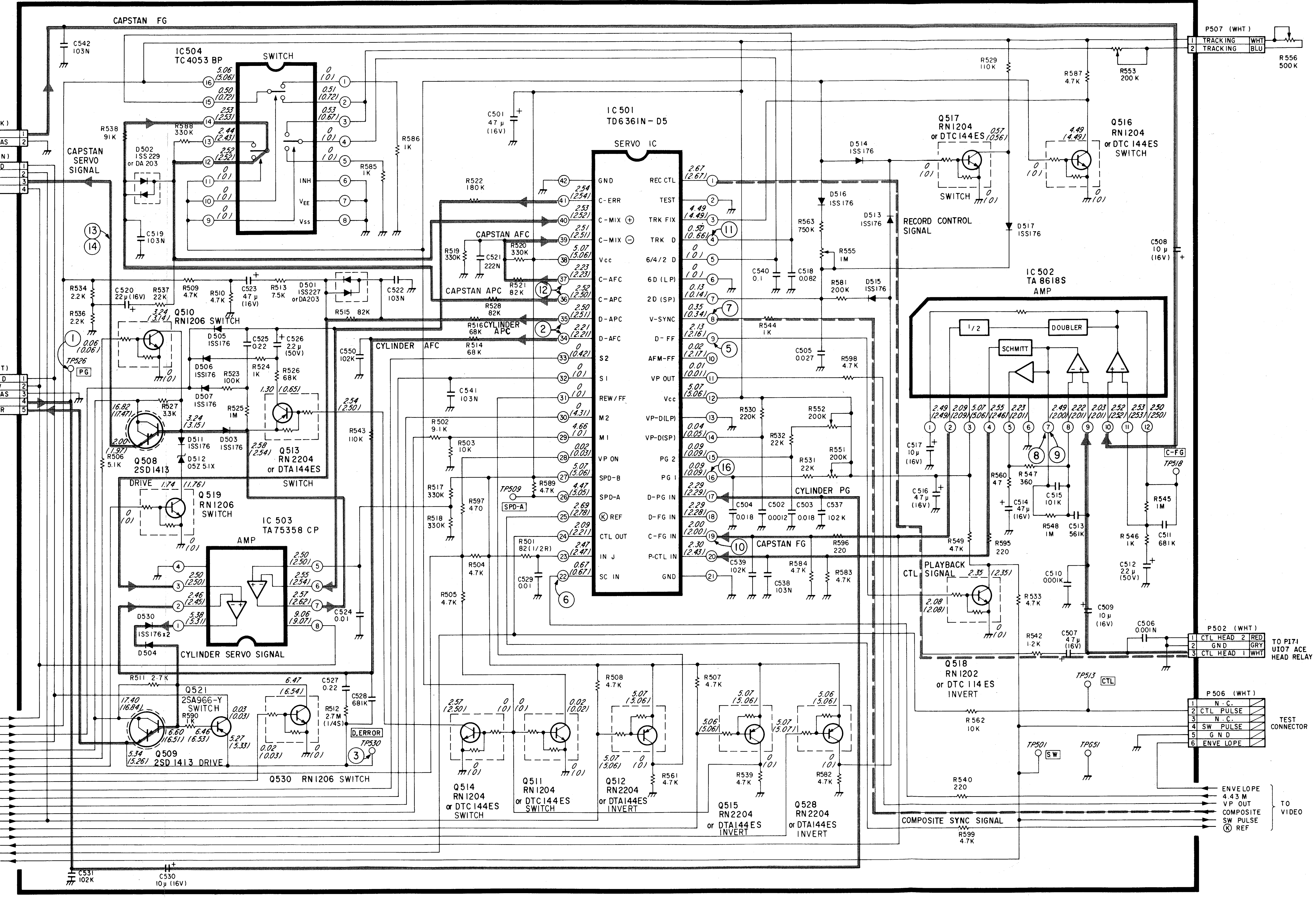


11-3. Servo Circuit

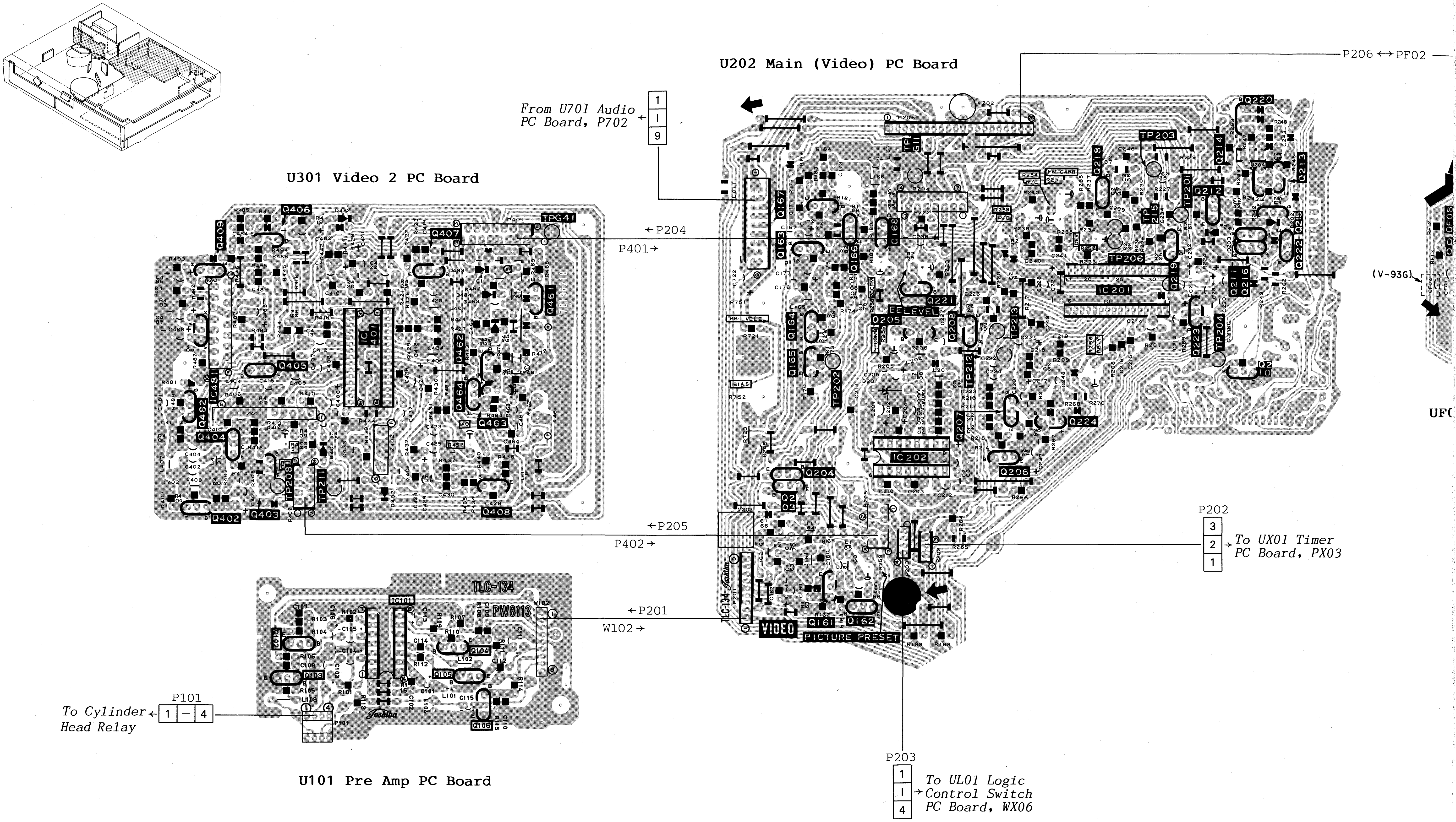

1
2
3
4
5
6
7
8
9
10
11
12
A
B
C
D
E
F
G
U202 SERVO
CAPSTAN MOTOR
TA-7262P
FG COIL
CYLINDER MOTOR
PG HEAD
P503 (BLK)
P505 (GRN)
P504 (WHT)
WHT F G
RED FG BIAS
WHT M. GND
ORG 3 ST
GRY ERROR
BLU +9V
M. GND
+9V
PG BIAS
P G
ERROR
CAPSTAN FG
C542 103N
IC504 TC4053 BP
SWITCH
INH
VEE
Vss
R538 91K
R588 330K
D502 1SS229 or DA203
CAPSTAN SERVO SIGNAL
C519 103N
R586 1K
R585 1K
IC501 TD6361N-D5
SERVO IC
C501 47μ (16V)
GND
C-ERR
C-MIX ⊕
C-MIX ⊖
Vcc
C-AFC
C-APC
D-APC
D-AFC
S2
S1
REW/FF
M2
M1
VP ON
SPD-B
SPD-A
Ⓚ REF
CTL OUT
IN J
SC IN
REC CTL
TEST
TRK FIX
TRK D
6/4/2 D
6D (LP)
2D (SP)
V-SYNC
D-FF
AFM-FF
VP OUT
VP-D(LP)
VP-D(SP)
PG 2
PG 1
D-PG IN
D-FG IN
C-FG IN
P-CTL IN
R522 180K
CAPSTAN AFC
CAPSTAN APC
CYLINDER APC
CYLINDER AFC
R519 330K
C521 222N
R520 330K
R521 82K
R528 82K
R516 68K
R514 68K
R515 82K
D501 1SS227 or DA203
C522 103N
R534 2.2K
R536 2.2K
C520 22μ (16V)
R537 22K
R509 4.7K
R510 4.7K
C523 47μ (16V)
R513 7.5K
Q510 RN1206 SWITCH
D505 1SS176
C525 0.22
C526 2.2μ (50V)
D506 1SS176
R523 100K
R524 1K
R526 68K
D507 1SS176
R525 1M
R527 3.3K
TP526
PG
Q508 2SD1413
R506 5.1K
D511 1SS176
D503 1SS176
D512 05Z 5.1X
Q513 RN2204 or DTA144ES SWITCH
C550 102K
R543 110K
C541 103N
Q519 RN1206 SWITCH
DRIVE
IC503 TA75358 CP
AMP
D530 1SS176x2
D504
CYLINDER SERVO SIGNAL
C524 0.01
R511 2.7K
Q521 2SA966-Y SWITCH
R590 1K
Q509 2SD1413 DRIVE
C527 0.22
C528 681K
R512 2.7M (1/4S)
D.ERROR
TP530
Q530 RN1206 SWITCH
ON/OFF +9V
ON/OFF +5V
STILL
M. GND
M+B
CAP OFF
FRAME
VP ON
CYLINDER OFF
S2
S1
REC MUTE
REC +B
FWD / REW
SLOW
X2
C-FG
CTL
SW
TO LOGIC
C531 102K
C530 10μ (16V)
R502 9.1K
R503 10K
R517 330K
R518 330K
R597 470
TP509
SPD-A
R589 4.7K
R501 82(1/2R)
R504 4.7K
R505 4.7K
C529 0.01
R508 4.7K
R507 4.7K
Q514 RN1204 or DTC144ES SWITCH
Q511 RN1204 or DTC144ES SWITCH
Q512 RN2204 or DTA144ES INVERT
R561 4.7K
R539 4.7K
Q515 RN2204 or DTA144ES INVERT
R582 4.7K
Q528 RN2204 or DTA144ES INVERT
D514 1SS176
D516 1SS176
D513 1SS176
R563 750K
R555 1M
RECORD CONTROL SIGNAL
Q517 RN1204 or DTC144ES
SWITCH
C540 0.1
C518 0.082
R581 200K
D515 1SS176
R544 1K
C505 0.027
R598 4.7K
R530 220K
R552 200K
R532 22K
R531 22K
R551 200K
CYLINDER PG
C504 0.018
C502 0.0012
C503 0.018
C537 102K
CAPSTAN FG
R596 220
C539 102K
C538 103N
R584 4.7K
R583 4.7K
C517 10μ (16V)
C516 47μ (16V)
R549 4.7K
CTL
PLAYBACK SIGNAL
Q518 RN1202 or DTC114ES INVERT
R562 10K
R540 220
COMPOSITE SYNC SIGNAL
R599 4.7K
R529 110K
1/2

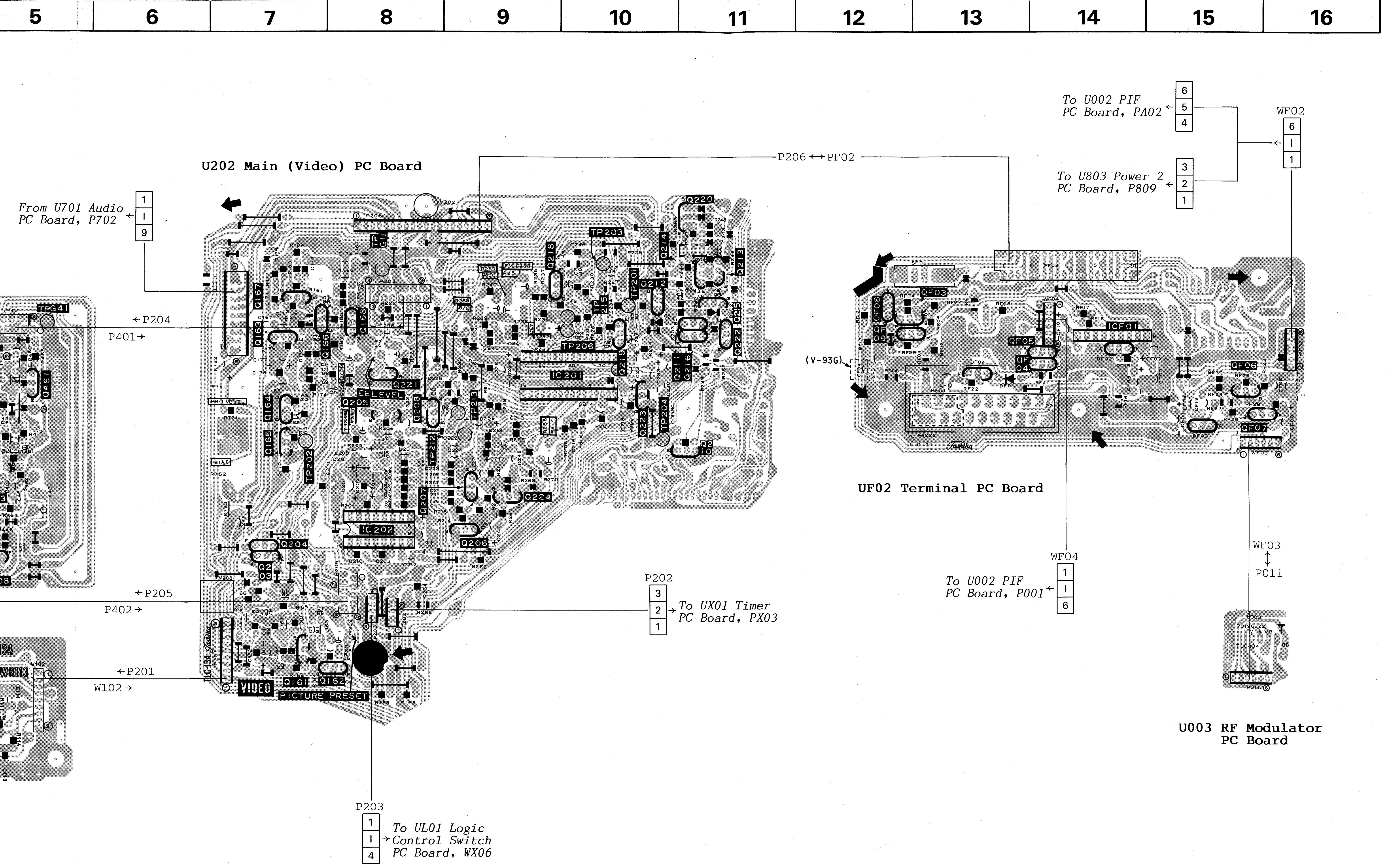
U202 SERVO

V : REC MODE
(V) : PLAY MODE


CAPSTAN FG
IC504 TC4053 BP
SWITCH
IC501 TD6361N-D5
SERVO IC
GND
C-ERR
C-MIX ⊕
C-MIX ⊖
Vcc
C-AFC
C-APC
D-APC
D-AFC
S2
S1
REW/FF
M2
M1
VP ON
SPD-B
SPD-A
Ⓚ REF
CTL OUT
IN J
SC IN
REC CTL
TEST
TRK FIX
TRK D
6/4/2 D
6D (LP)
2D (SP)
V-SYNC
D-FF
AFM-FF
VP OUT
VP-D(LP)
VP-D(SP)
PG 2
PG 1
D-PG IN
D-FG IN
C-FG IN
P-CTL IN
CAPSTAN SERVO SIGNAL
CAPSTAN AFC
CAPSTAN APC
CYLINDER APC
CYLINDER AFC
CYLINDER SERVO SIGNAL
CYLINDER PG
CAPSTAN FG
RECORD CONTROL SIGNAL
PLAYBACK CTL SIGNAL
COMPOSITE SYNC SIGNAL
IC503 TA75358 CP
AMP
IC502 TA 8618S
AMP
1/2
DOUBLER
SCHMITT
Q508 2SD1413 DRIVE
Q509 2SD 1413 DRIVE
Q510 RN1206 SWITCH
Q513 RN 2204 or DTA144ES SWITCH
Q516 RN1204 or DTC 144ES SWITCH
Q517 RN1204 or DTC144ES SWITCH
Q518 RN1202 or DTC 114 ES INVERT
Q519 RN1206 SWITCH
Q521 2SA966-Y SWITCH
Q530 RN1206 SWITCH
Q511 RN1204 or DTC144ES SWITCH
Q512 RN2204 or DTA144ES INVERT
Q514 RN1204 or DTC144ES SWITCH
Q515 RN2204 or DTA144ES INVERT
Q528 RN2204 or DTA144ES INVERT
D.ERROR
TP530
TP526
PG
TP509
SPD-A
TP518
C-FG
TP513
CTL
TP501
SW
TPG51
P507 (WHT)
TRACKING WHT
TRACKING BLU
R556 500K
P502 (WHT)
CTL HEAD 2 RED
GND GRY
CTL HEAD 1 WHT
TO P171 U107 ACE HEAD RELAY
P506 (WHT)
N.C.
CTL PULSE
N.C.
SW PULSE
GND
ENVE LOPE
TEST CONNECTOR
ENVELOPE
4.43 M
VP OUT
COMPOSITE
SW PULSE
Ⓚ REF
TO VIDEO

12-2. Main (Video), Video 2, Pre Amp, Terminal PC Board


1 2 3 4 5 6 7 8 9 10 11 12
A B C D E F G
U202 Main (Video) PC Board
P206 ↔ PF02
From U701 Audio PC Board, P702
1
|
9
U301 Video 2 PC Board
← P204
P401 →
← P205
P402 →
← P201
W102 →
TPG41
IC401
7C196218
TLC-134
PW8113
IC101
Toshiba
IC201
IC202
TP203
TP206
EE LEVEL
PB LEVEL
BIAS
Y-COMB
PB.Y
VIDEO
PICTURE PRESET
FM CARR
W/C
D/C
(V-93G)
UF
P202
3
2
1
→ To UX01 Timer PC Board, PX03
P203
1
|
4
→ To UL01 Logic Control Switch PC Board, WX06
P101
To Cylinder Head Relay ←
1 — 4
U101 Pre Amp PC Board

5
6
7
8
9
10
11
12
13
14
15
16
U202 Main (Video) PC Board
From U701 Audio PC Board, P702
1
I
9
P206 ↔ PF02
←P204
P401→
←P205
P402→
←P201
W102→
P202
3
2
1
To UX01 Timer PC Board, PX03
P203
1
I
4
To UL01 Logic Control Switch PC Board, WX06
VIDEO
PICTURE PRESET
IC201
IC202
TP203
TP206
EE LEVEL
PB-LVEL ADJ
BIAS
To U002 PIF PC Board, PA02
6
5
4
To U803 Power 2 PC Board, P809
3
2
1
WF02
6
I
1
(V-93G)
UF02 Terminal PC Board
ICF01
WF04
1
I
6
To U002 PIF PC Board, P001
WF03
P011
U003 RF Modulator PC Board

Voltage and Location Transistors

(Unit:V)

Symbol No.	REC MODE			PLAY MODE			Loca-tion
	E	C	B	E	C	B	
Q102	0	0	0.77	0	0	0	F-3
Q103	0	0	0.77	0	0	0	F-3
Q104	0	0	0	1.81	5.0	2.46	F-5
Q105	0	0	0	2.26	5.14	2.90	F-4
Q106	0	4.42	0	0	0	0.75	G-5
Q161	0	0	0	0.57	3.20	1.25	F-7
Q162	0	0	0	2.58	5.14	3.20	F-8
Q163	0	—	0	0	0	4.31	C-7
Q164	8.40	4.49	7.68	0	0	0	D-7
Q165	0.62	4.50	1.35	0	0	0	D-7
Q166	4.24	9.02	4.94	0	0	0	C-7
Q167	0.30	4.94	0.96	0	0	0	C-7
Q168	2.92	0	2.25	0	0	2.48	C-8
Q203	0	9.11	0	0	0.06	5.14	E-7
Q204	9.11	0	9.11	9.09	8.72	0.06	E-7
Q205	0	0	0	2.47	0	1.80	D-8
Q206	0	0	0	0	0	0	E-9
Q207	0.81	2.95	1.45	0.81	2.92	1.44	D-8
Q208	0	0.89	0	0	0.88	0	D-8
Q210	0	0	0	0	0.02	0	D-11
Q211	5.06	0	5.10	5.10	0	5.05	C-11
Q212	0	0	0.63	0	0	0.62	C-10
Q213	0	0.07	0.67	0	0.06	0.66	B-11
Q214	0	5.06	0.07	0	5.05	0.06	B-10
Q215	5.06	3.04	5.09	5.05	3.03	5.07	C-11
Q216	0	5.08	1.63	5.05	5.07	1.62	C-11
Q218	0	0	0.19	0	0	4.92	B-9
Q219	5.06	5.04	0.19	5.05	3.06	4.92	C-10
Q220	5.06	1.71	2.19	5.05	7.83	0.16	B-11
Q221	2.45	0	1.82	2.99	0	2.35	C-8
Q222	5.06	0	5.01	5.06	0.17	5.02	C-11
Q223	0	0 2.1	0 3.9	0	0 2.1	0 3.9	D-10
Q224	3.2	3.1	0	3.2	0	5	D-9
Q402	0	0	0	0.86	5.13	1.51	E-3
Q403	1.30	0	0.04	1.92	0	1.27	E-3
Q404	0.44	3.16	1.12	0.44	3.16	1.12	E-3
Q405	2.51	5.06	3.15	2.56	5.06	3.15	D-3
Q406	0.98	5.06	1.61	0.98	5.06	1.61	C-3
Q407	2.92	5.06	3.59	2.92	5.06	3.59	C-4
Q408	2.02	5.02	2.65	2.01	5.06	2.65	E-5
Q409	5.06	0.09	4.99	5.06	0.99	4.99	C-3
Q461	1.92	5.06	2.57	2.08	5.06	2.73	C-5
Q462	—	5.0	2.58	--	5.0	2.74	D-4
Q463	0.81	2.58	0.10	1.40	2.74	2.06	D-5
Q464	0.64	0.81	0.19	1.30	1.40	2.00	D-4
Q482	0	0	0	5.15	5.15	3.43	D-2
QF03	0	0.14	0.11	0	3.82	0.11	C-13
QF04	11.97	0	11.95	11.98	11.96	11.97	C-13
QF05	0	11.95	0.18	0	0	4.93	C-13
QF06	2.65	0	1.94	2.51	0	1.81	C-15
QF07	5.23	9.10	5.86	5.17	9.10	5.81	D-15
QF08	0	0	0.11	0	0	0.11	C-12
QF09	0	0	0.68	0	0	0.67	C-12
QF61	1.46	5.54	2.12	1.46	5.43	2.12	

Location of IC's

Symbol No.	Loca-tion
IC101	F-4
IC201	C-10
IC202	E-8
IC401	D-4
IC481	D-2
ICF01	C-14

Location of Diodes

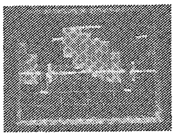
Symbol No.	Loca-tion
D201	D-8
D202	C-11
D203	C-10
D204	B-11
D401	E-3
D402	E-4
D461	D-5
D481	D-2
D482	C-3
D483	C-4
D484	C-4
DF01	C-13
DF02	C-14
DF03	D-15
DF04	C-13

Location of Adjusting VR's

Symbol No.	Loca-tion
R251	C-9
R252	C-9
R253	C-9
R254	B-9
R255	C-8
R256	D-9
R257	D-8
R258	C-8
R259	E-8
R451	E-3
R452	E-4
R751	C-7
R752	D-7

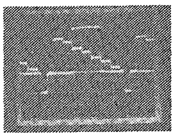
Record Mode

① TP201



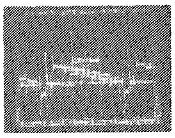
V: 0.2V/div.
H: 10μs/div.
C-8

② IC201, Pin ㉔



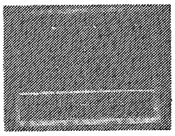
V: 0.1V/div.
H: 10μs/div.
B-10

③ TP206



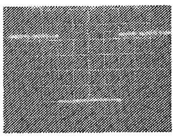
V: 0.2V/div.
H: 10μs/div.
B-10

④ TP204



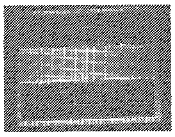
V: 1V/div.
H: 20μs/div.
A-8

⑤ Q220, Collector



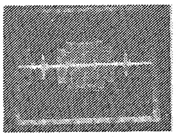
V: 1V/div.
H: 5ms/div.
F-11

⑥ TP202



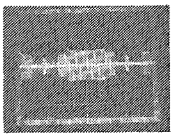
V: 0.1V/div.
H: 10μs/div.
F-7

⑦ IC401, ㉒



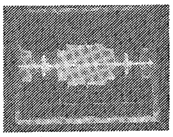
V: 0.05V/div.
H: 10μs/div.
D-15

⑧ IC401, Pin ⑯



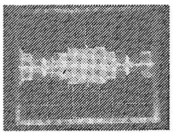
V: 0.5V/div.
H: 10μs/div.
D-16

⑨ IC401, Pin ㉚



V: 0.2V/div.
H: 10μs/div.
D-14

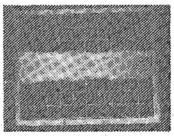
⑩ TP208



V: 0.1V/div.
H: 10μs/div.
F-13

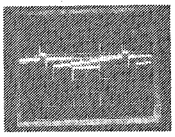
Playback Mode

⑪ TP101



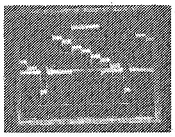
V: 0.1V/div.
H: 5ms/div.
G-12

⑫ Q207, Emitter



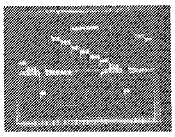
V: 0.2V/div.
H: 10μs/div.
E-10

⑬ TP212



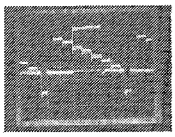
V: 0.1V/div.
H: 10μs/div.
D-10

⑭ TP213



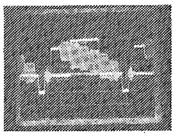
V: 0.1V/div.
H: 10μs/div.
E-7

⑮ IC201, Pin ㉔



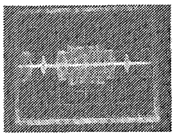
V: 0.1V/div.
H: 10μs/div.
B-10

⑯ TP203



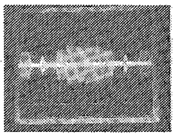
V: 0.5V/div.
H: 10μs/div.
B-9

⑰ IC201, Pin ㉙



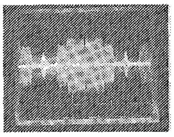
V: 0.1V/div.
H: 10μs/div.
B-9

⑱ IC401, Pin ⑳



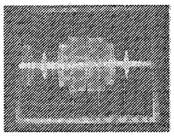
V: 0.05V/div.
H: 10μs/div.
D-15

⑲ IC401, Pin ㉖



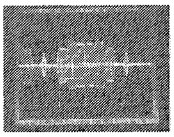
V: 0.2V/div.
H: 10μs/div.
D-14

⑳ IC401, Pin ㉘



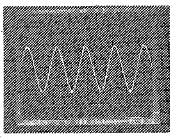
V: 0.02V/div.
H: 10μs/div.
D-14

㉑ IC401, Pin ㉚



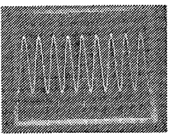
V: 0.2V/div.
H: 10μs/div.
D-14

㉒ TP211



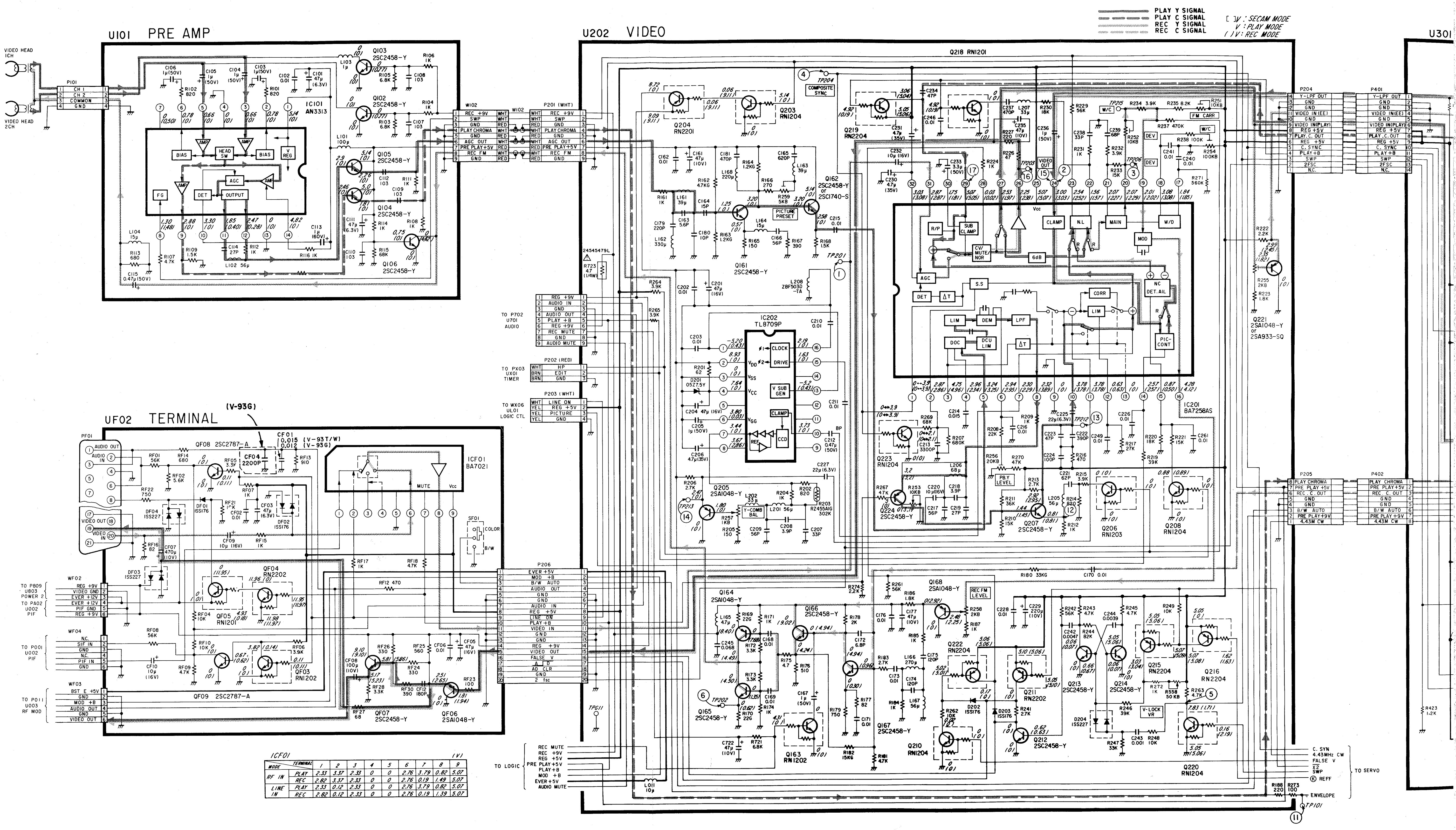
V: 0.1V/div.
H: 0.1μs/div.
G-13

㉓ Q407, Emitter



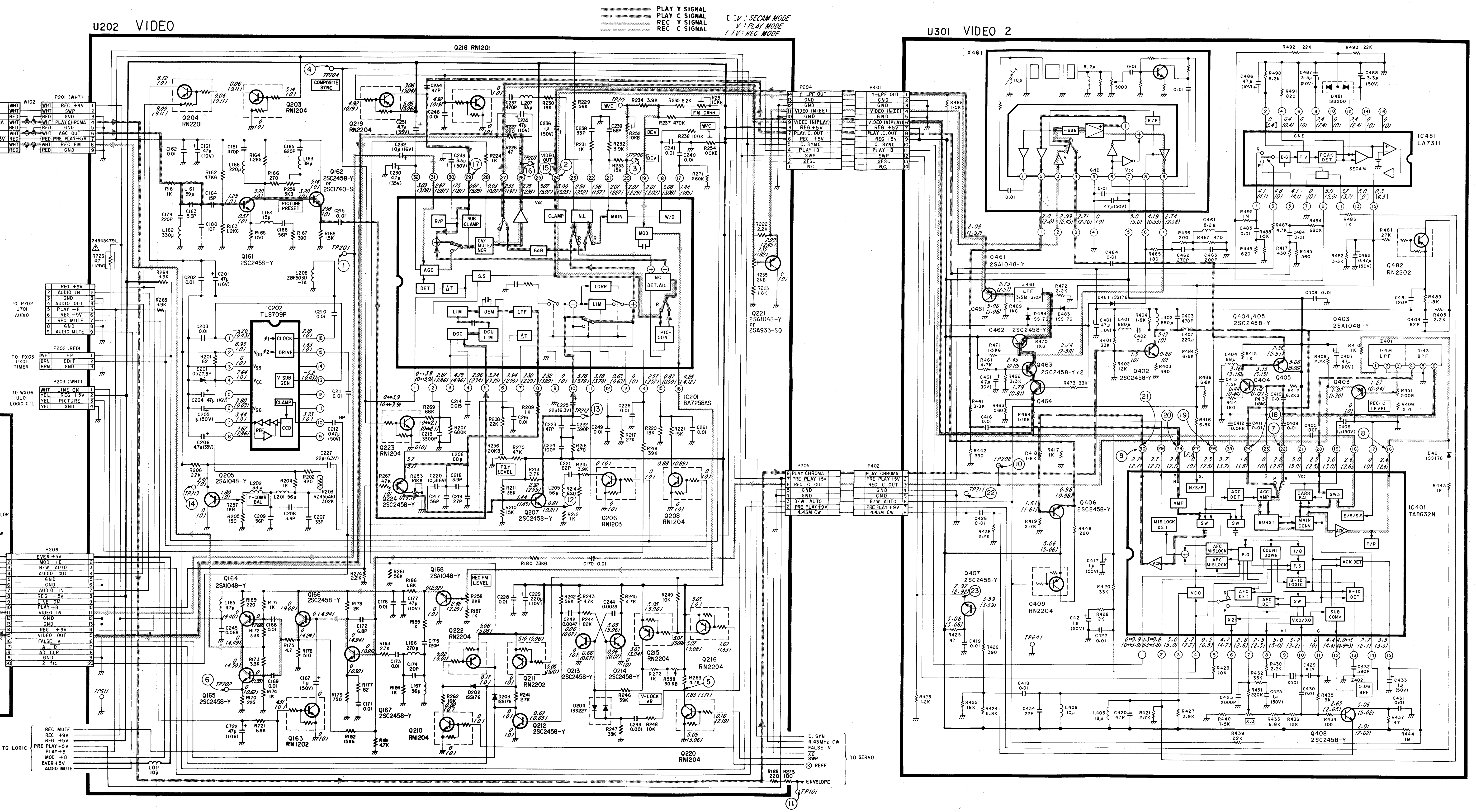
V: 0.1V/div.
H: 0.1μs/div.
E-13

12-3. Video, Video 2, Pre Amp, Terminal Circuit

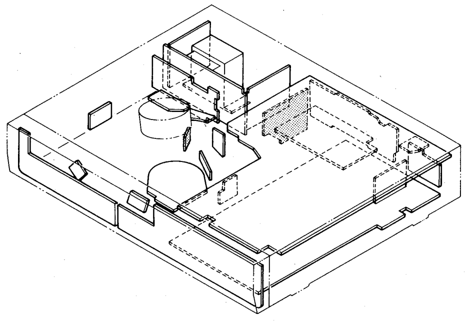

1
2
3
4
5
VIDEO
VIDEO
6
7
8
9
10
11
12
A
B
C
D
E
F
G
PLAY Y SIGNAL
PLAY C SIGNAL
REC Y SIGNAL
REC C SIGNAL
[ ]V : SECAM MODE
V : PLAY MODE
( )V : REC MODE
U101 PRE AMP
VIDEO HEAD 1CH
VIDEO HEAD 2CH
P101
CH 1
CH 2
COMMON
GND
IC101 AN3313
BIAS
HEAD SW
AGC
OUTPUT
DET
FG
REG
Q102 2SC2458-Y
Q103 2SC2458-Y
Q104 2SC2458-Y
Q105 2SC2458-Y
Q106 2SC2458-Y
W102
REC +9V
SWP
GND
PLAY CHROMA
AGC OUT
PRE PLAY+5V
REC FM
P201 (WHT)
U202 VIDEO
Q218 RN1201
Q203 RN1204
Q204 RN2201
Q219 RN2204
COMPOSITE SYNC
PICTURE PRESET
Q161 2SC2458-Y
Q162 2SC2458-Y or 2SC1740-S
IC202 TL8709P
CLOCK
DRIVE
V SUB GEN
CLAMP
CCD
REF
IC201 BA7258AS
R/P
SUB CLAMP
CV/MUTE/NOR
AGC
DET
ΔT
S.S
LIM
DEM
LPF
DOC
DCU LIM
CLAMP
N.L
MAIN
W/D
MOD
6dB
CORR
NC DET.AIL
PIC-CONT
W/C
FM CARR
DEV
VIDEO OUT
P204
Y-LPF OUT
GND
GND
VIDEO IN(EE)
GND
VIDEO IN(PLAY)
REG +5V
PLAY.C. OUT
REG +5V
C. SYNC
PLAY+B
SWP
2FSC
N.C.
P401
U301
Q221 2SA1048-Y or 2SA933-SQ
TO P702 U701 AUDIO
REG +9V
AUDIO IN
GND
AUDIO OUT
PLAY +B
REG +9V
REC MUTE
GND
AUDIO MUTE
TO PX03 UX01 TIMER
P202 (RED)
HP
EDIT
GND
TO WX06 UL01 LOGIC CTL
P203 (WHT)
LINE ON
REG +5V
PICTURE
GND
Q205 2SA1048-Y
Y-COMB BAL
Q223 RN1204
Q224 2SC2458-Y
PBY LEVEL
Q207 2SC2458-Y
Q206 RN1203
Q208 RN1204
P205
P402
PLAY CHROMA
PRE PLAY +5V
REC C OUT
GND
GND
B/W AUTO
PRE PLAY+9V
4.43M CW
UF02 TERMINAL
(V-93G)
PF01
AUDIO OUT
AUDIO IN
VIDEO OUT
VIDEO IN
QF08 2SC2787-A
CF01 0.015 (V-93T/W) 0.012 (V-93G)
CF04 2200P
ICF01 BA7021
MUTE
Vcc
SF01
COLOR
B/W
QF04 RN2202
QF05 RN1201
QF03 RN1202
QF09 2SC2787-A
QF07 2SC2458-Y
QF06 2SA1048-Y
WF02
TO P809 U803 POWER 2
TO PA02 U002 PIF
REG +9V
VIDEO GND
EVER +12V
PIF GND
WF04
TO P001 U002 PIF
N.C.
SIF IN
GND
PIF IN
WF03
TO P011 U003 RF MOD
BST E +5V
MOD +B
AUDIO OUT
VIDEO OUT
P206
EVER +5V
MOD +B
B/W AUTO
AUDIO OUT
GND
AUDIO IN
REG +5V
LINE ON
PLAY+B
VIDEO IN
REG +9V
VIDEO OUT
FALSE V
A D
AD CLR
2 fsc
Q164 2SA1048-Y
Q165 2SC2458-Y
Q163 RN1202
Q166 2SC2458-Y
Q167 2SC2458-Y
Q168 2SA1048-Y
REC FM LEVEL
Q222 RN2204
Q210 RN1204
Q211 RN2202
Q212 2SC2458-Y
Q213 2SC2458-Y
Q214 2SC2458-Y
Q215 RN2204
Q216 RN2204
Q220 RN1204
V-LOCK VR
TO LOGIC
REC MUTE
REC +9V
REG +5V
PRE PLAY+5V
PLAY+B
MOD +B
EVER+5V
AUDIO MUTE
C. SYN
4.43MHz CW
FALSE V
SWP
REFF
TO SERVO
ENVELOPE
TP101

ICF01 (V)

MODE \ TERMINAL		1	2	3	4	5	6	7	8	9
RF IN	PLAY	2.33	3.37	2.33	0	0	2.76	3.79	0.82	5.07
	REC	2.82	3.37	2.33	0	0	2.76	0.19	1.49	5.07
LINE IN	PLAY	2.33	0.12	2.33	0	0	2.76	3.79	0.82	5.07
	REC	2.82	0.12	2.33	0	0	2.76	0.19	1.39	5.07


PLAY Y SIGNAL
PLAY C SIGNAL
REC Y SIGNAL
REC C SIGNAL
[ ]V : SECAM MODE
V : PLAY MODE
( )V : REC MODE
U202 VIDEO
U301 VIDEO 2
Q218 RN1201
IC202 TL8709P
IC201 BA7258AS
IC401 TA8632N
IC481 LA7311
P201 (WHT)
P202 (RED)
P203 (WHT)
P204
P205
P206
P401
P402
W102
X461
TO P702 U701 AUDIO
TO PX03 UX01 TIMER
TO WX06 UL01 LOGIC CTL
TO LOGIC
TO SERVO
C. SYN
4.43MHz CW
FALSE V
X2
SWP
REFF
ENVELOPE
TP101
Q204 RN2201
Q203 RN1204
Q219 RN2204
Q162 2SC2458-Y or 2SC1740-S
Q161 2SC2458-Y
Q221 2SA1048-Y or 2SA933-SQ
Q205 2SA1048-Y
Q223 RN1204
Q224 2SC2458-Y
Q207 2SC2458-Y
Q206 RN1203
Q208 RN1204
Q164 2SA1048-Y
Q166 2SC2458-Y
Q168 2SA1048-Y
Q165 2SC2458-Y
Q163 RN1202
Q167 2SC2458-Y
Q210 RN1204
Q222 RN2204
Q211 RN2202
Q213 2SC2458-Y
Q212 2SC2458-Y
Q214 2SC2458-Y
Q215 RN2204
Q216 RN2204
Q220 RN1204
Q461 2SA1048-Y
Q462 2SC2458-Y
Q463 2SC2458-Y x 2
Q464
Q402 2SC2458-Y
Q404,405 2SC2458-Y
Q403 2SA1048-Y
Q482 RN2202
Q406 2SC2458-Y
Q407 2SC2458-Y
Q409 RN2204
Q408 2SC2458-Y
COMPOSITE SYNC
PICTURE PRESET
VIDEO OUT
PBLY LEVEL
REC FM LEVEL
V-LOCK VR
FM CARR
W/C
DEV
REC-C LEVEL
Z401 1.4M LPF 4.43 BPF
Z461 LPF 3.5M13.0M
Y-COMB BAL

13-2. Audio PC Board



Voltage and Location of Transistors

V : REC MODE
(V): PLAY MODE

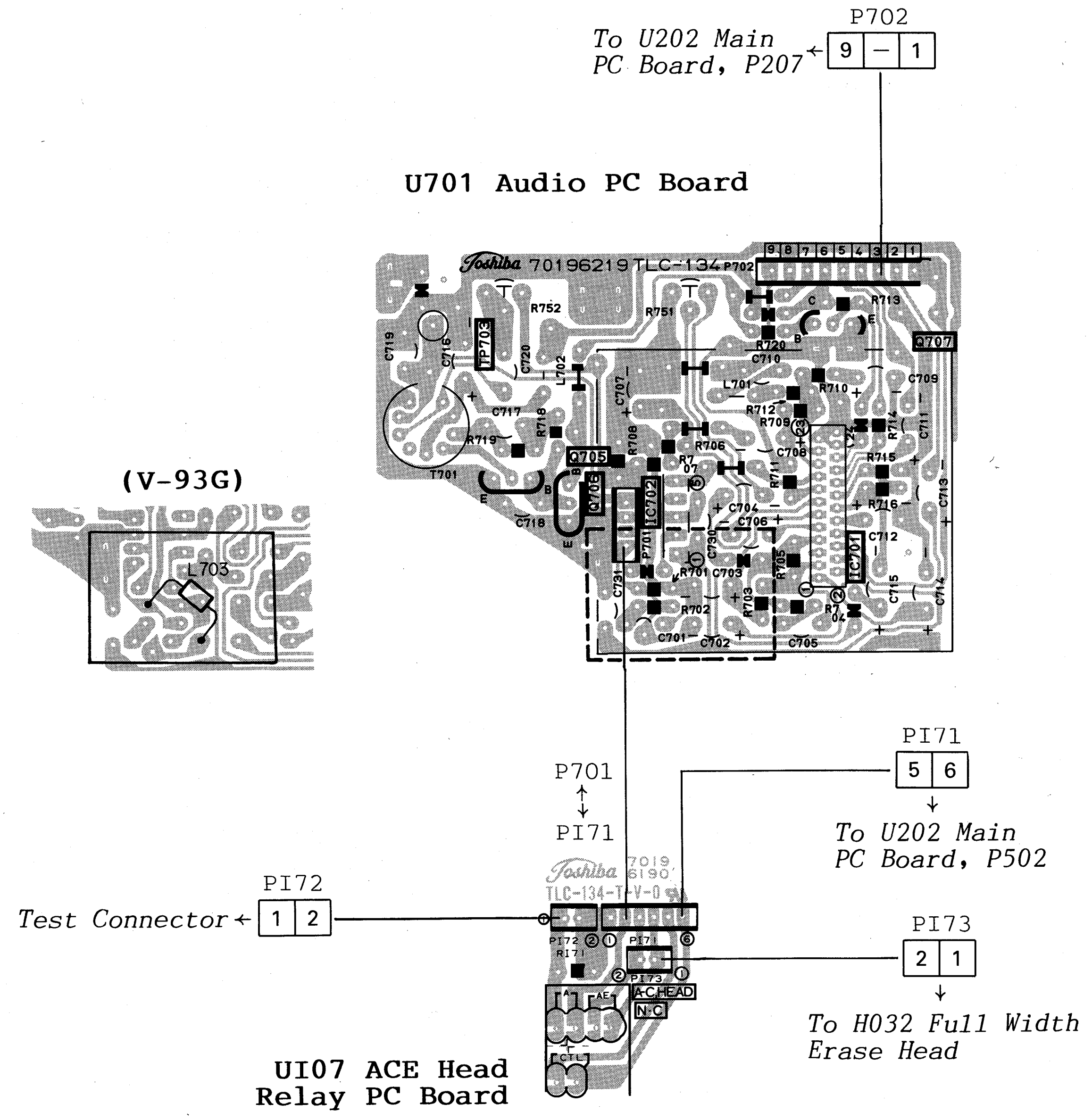
Symbol No.	Voltage (Unit:V)			Location
	E	C	B	
Q705	0(0)	8.3(0)	0(0)	E-3
Q706	0(0)	0(0)	0(3.6)	E-3
Q707	0(0)	5.5(0)	0(2.4)	D-5

Location of IC's

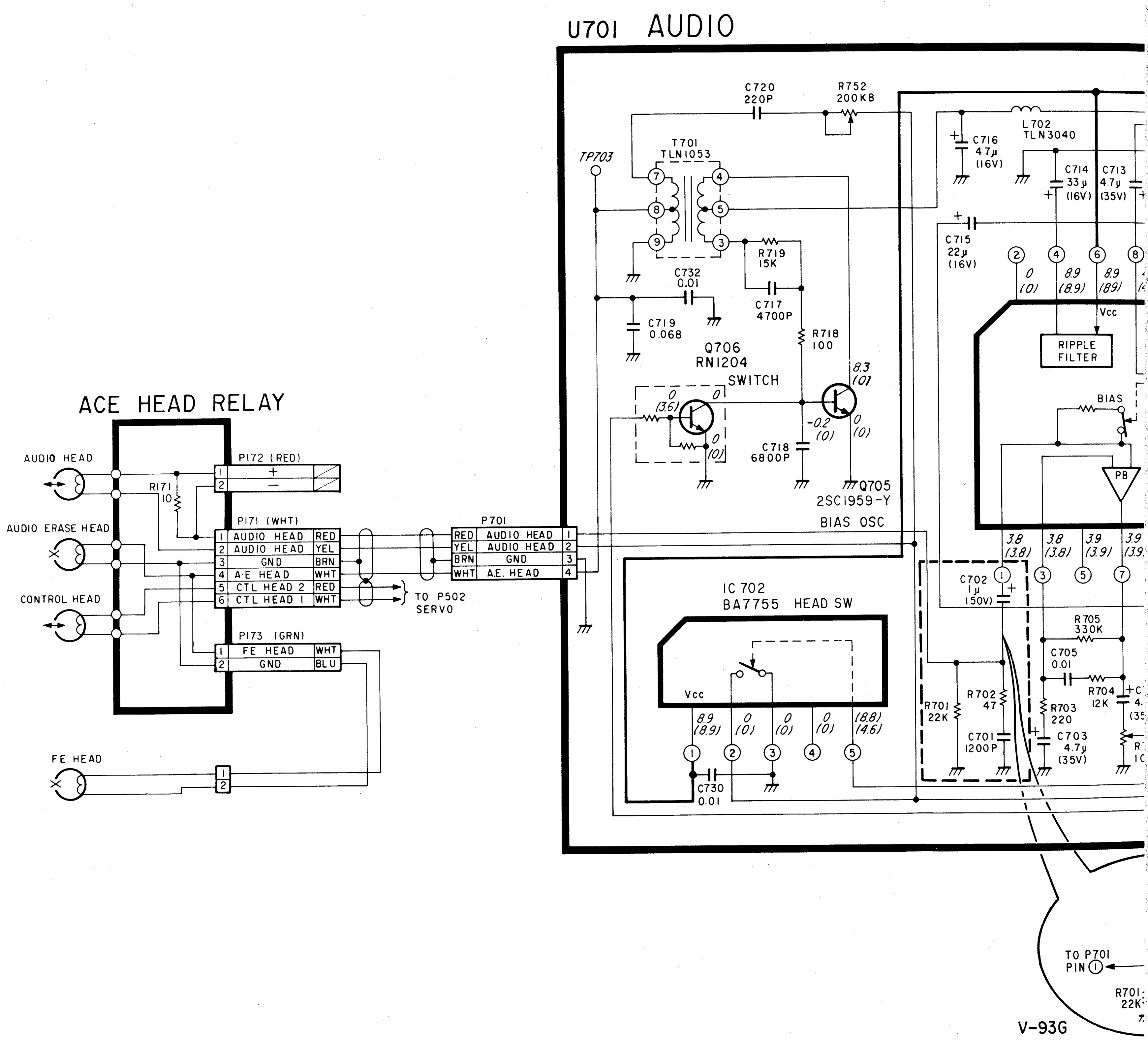
Symbol No.	Location
IC701	E-4
IC702	E-4

Location of Adjusting VR's

Symbol No.	Location
R751	D-4
R752	D-3


To U202 Main PC Board, P207
P702
9 — 1
U701 Audio PC Board
Toshiba 70196219 TLC-134 P702
R752
R751
TP703
C716
C719
C720
L702
R720
C710
C707
L701
R710
R713
Q707
C709
C717
R712
R709
R714
R711
R718
R719
Q705
R706
R707
C708
R715
R716
T701
Q706
IC702
C704
C706
C713
C718
C730
R701
C703
R705
IC701
C712
C731
P701
R702
R703
R704
C715
C714
C701
C702
C705
(V-93G)
L703
P701
PI71
PI71
5 6
To U202 Main PC Board, P502
PI72
Test Connector
1 2
Toshiba 7019 6190 TLC-134-T-V-0
PI72
R171
PI71
PI73
A-C HEAD
N-C
CTL
PI73
2 1
To H032 Full Width Erase Head
UI07 ACE Head Relay PC Board

13-3. Audio Circuit

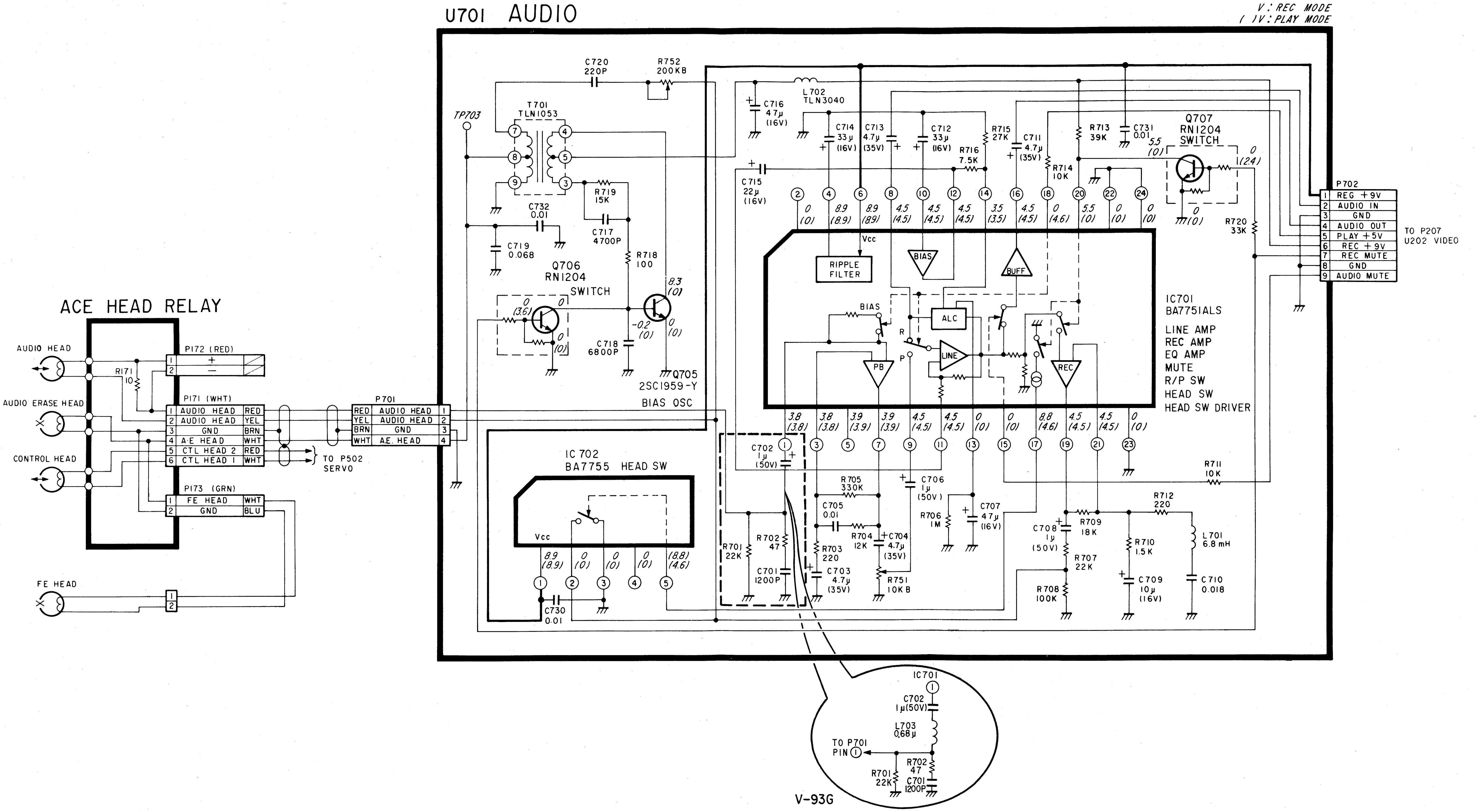

ACE HEAD RELAY
AUDIO HEAD
AUDIO ERASE HEAD
CONTROL HEAD
FE HEAD
R171 10
P172 (RED)
+
—
P171 (WHT)
1 AUDIO HEAD RED
2 AUDIO HEAD YEL
3 GND BRN
4 A·E HEAD WHT
5 CTL HEAD 2 RED
6 CTL HEAD 1 WHT
TO P502 SERVO
P173 (GRN)
1 FE HEAD WHT
2 GND BLU
P701
RED AUDIO HEAD 1
YEL AUDIO HEAD 2
BRN GND 3
WHT AE. HEAD 4
U701 AUDIO
TP703
C720 220P
R752 200KB
T701 TLN1053
C732 0.01
C719 0.068
R719 15K
C717 4700P
R718 100
Q706 RN1204
SWITCH
C718 6800P
Q705 2SC1959-Y
BIAS OSC
8.3 (0)
0 (3.6)
-0.2 (0)
C716 47μ (16V)
L702 TLN3040
C714 33μ (16V)
C713 4.7μ (35V)
C715 22μ (16V)
8.9 (8.9)
RIPPLE FILTER
Vcc
BIAS
PB
IC 702 BA7755 HEAD SW
Vcc
8.9 (8.9)
(8.8) (4.6)
C730 0.01
C702 1μ (50V)
3.8 (3.8)
3.9 (3.9)
R705 330K
C705 0.01
R704 12K
R701 22K
R702 47
R703 220
C701 1200P
C703 4.7μ (35V)
TO P701 PIN①
R701 22K
V-93G

MODE
/ MODE

oca- ion
-3
-3
-5

usting VR's

13-3. Audio Circuit


U701 AUDIO
V : REC MODE
( ) V : PLAY MODE
ACE HEAD RELAY
AUDIO HEAD
AUDIO ERASE HEAD
CONTROL HEAD
FE HEAD
R171 10
P172 (RED)
+
−
P171 (WHT)
1 AUDIO HEAD RED
2 AUDIO HEAD YEL
3 GND BRN
4 A·E HEAD WHT
5 CTL HEAD 2 RED
6 CTL HEAD 1 WHT
TO P502 SERVO
P173 (GRN)
1 FE HEAD WHT
2 GND BLU
P701
RED AUDIO HEAD 1
YEL AUDIO HEAD 2
BRN GND 3
WHT A.E. HEAD 4
TP703
C720 220P
R752 200KB
T701 TLN1053
C732 0.01
C719 0.068
R719 15K
C717 4700P
R718 100
Q706 RN1204 SWITCH
C718 6800P
Q705 2SC1959-Y BIAS OSC
8.3 (0)
-0.2 (0)
0 (3.6)
L702 TLN3040
C716 47μ (16V)
C714 33μ (16V)
C713 4.7μ (35V)
C712 33μ (16V)
R715 27K
R716 7.5K
C711 4.7μ (35V)
R714 10K
R713 39K
C731 0.01
Q707 RN1204 SWITCH
C715 22μ (16V)
R720 33K
P702
1 REG +9V
2 AUDIO IN
3 GND
4 AUDIO OUT
5 PLAY +5V
6 REC +9V
7 REC MUTE
8 GND
9 AUDIO MUTE
TO P207 U202 VIDEO
Vcc
RIPPLE FILTER
BIAS
BUFF
ALC
LINE
PB
REC
R
P
IC701 BA7751ALS
LINE AMP
REC AMP
EQ AMP
MUTE
R/P SW
HEAD SW
HEAD SW DRIVER
IC702 BA7755 HEAD SW
C730 0.01
C702 1μ (50V)
R701 22K
R702 47
C701 1200P
R705 330K
C705 0.01
R704 12K
C704 4.7μ (35V)
R703 220
C703 4.7μ (35V)
R751 10KB
C706 1μ (50V)
R706 1M
C707 47μ (16V)
C708 1μ (50V)
R709 18K
R707 22K
R708 100K
R710 1.5K
C709 10μ (16V)
R712 220
L701 6.8mH
C710 0.018
R711 10K
IC701
C702 1μ(50V)
L703 0.68μ
TO P701 PIN ①
R702 47
R701 22K
C701 1200P
V-93G

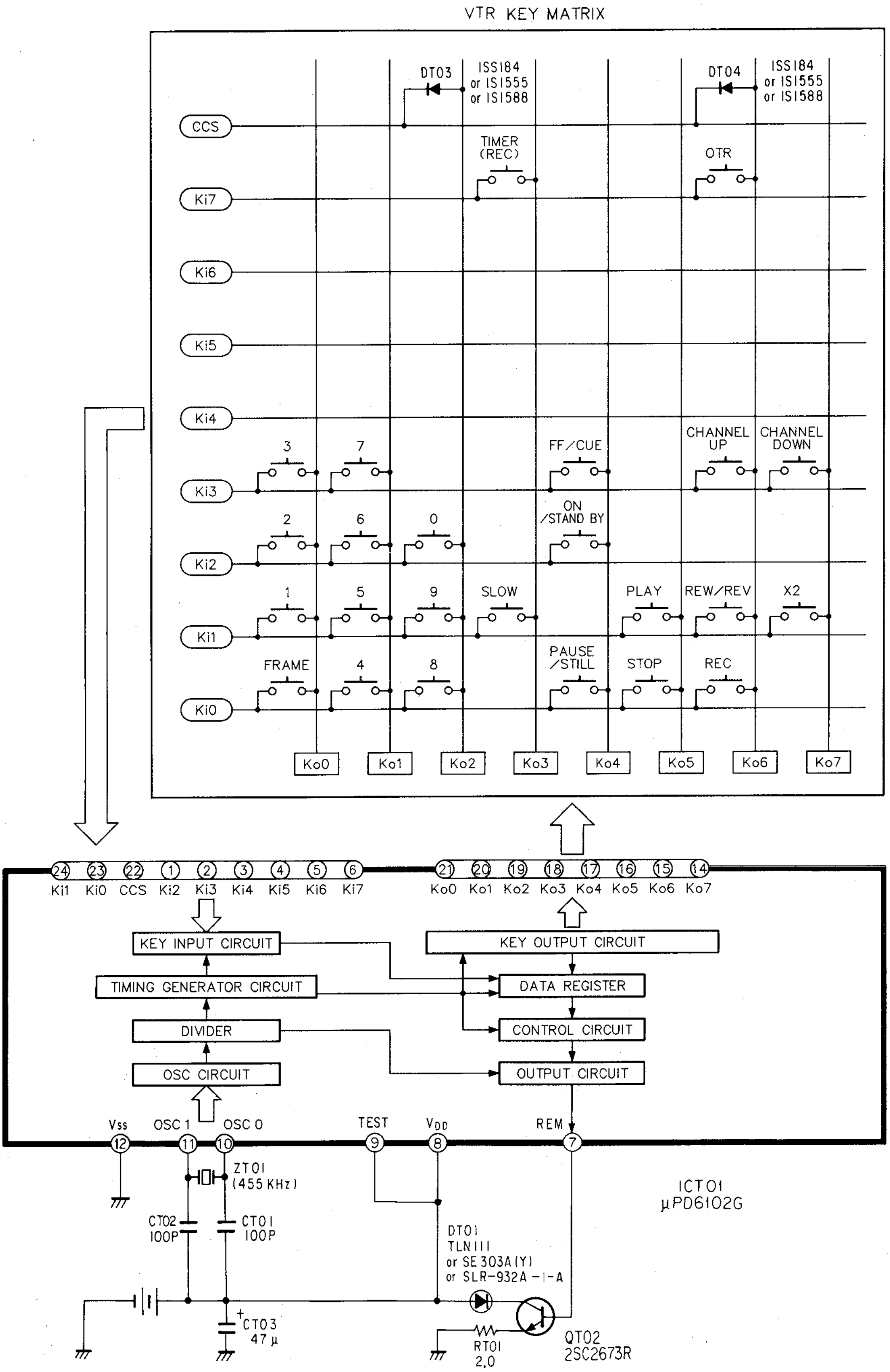
71
6

Main
d, P502

73
1

ull Width
d

14. Remote Control Circuit


VTR KEY MATRIX
DT03
ISS184
or IS1555
or IS1588
DT04
ISS184
or IS1555
or IS1588
CCS
Ki7
Ki6
Ki5
Ki4
Ki3
Ki2
Ki1
Ki0
TIMER
(REC)
OTR
3
7
FF/CUE
CHANNEL UP
CHANNEL DOWN
2
6
0
ON
/STAND BY
1
5
9
SLOW
PLAY
REW/REV
X2
FRAME
4
8
PAUSE
/STILL
STOP
REC
Ko0
Ko1
Ko2
Ko3
Ko4
Ko5
Ko6
Ko7
24 Ki1
23 Ki0
22 CCS
1 Ki2
2 Ki3
3 Ki4
4 Ki5
5 Ki6
6 Ki7
21 Ko0
20 Ko1
19 Ko2
18 Ko3
17 Ko4
16 Ko5
15 Ko6
14 Ko7
KEY INPUT CIRCUIT
TIMING GENERATOR CIRCUIT
DIVIDER
OSC CIRCUIT
KEY OUTPUT CIRCUIT
DATA REGISTER
CONTROL CIRCUIT
OUTPUT CIRCUIT
Vss 12
OSC 1 11
OSC 0 10
TEST 9
VDD 8
REM 7
ZT01
(455 KHz)
CT02
100P
CT01
100P
CT03
47 µ
DT01
TLN111
or SE303A(Y)
or SLR-932A-1-A
RT01
2.0
QT02
2SC2673R
ICT01
µPD6102G

SECTION 4
PARTS LIST

SAFETY PRECAUTION

The parts identified by ⚠ mark are critical for safety. Replace only with part number specified.
The mounting position of replacement is to be identical with originals. The substitute replacement parts which do not have the same safety characteristics as specified in the parts list may create shock, fire or other hazards.

NOTICE

The part number must be used when ordering parts in order to assist in processing, be sure to include the model number and description.

*: V-93G only.
X : V-93W only.

ABBREVIATIONS

1. Integrated circuit (IC)

2. Capacitor (Cap)

   MF . . . . . . microfarad
   PF . . . . . . picofarad (micro-microfarad)

3. Resistor (Res)

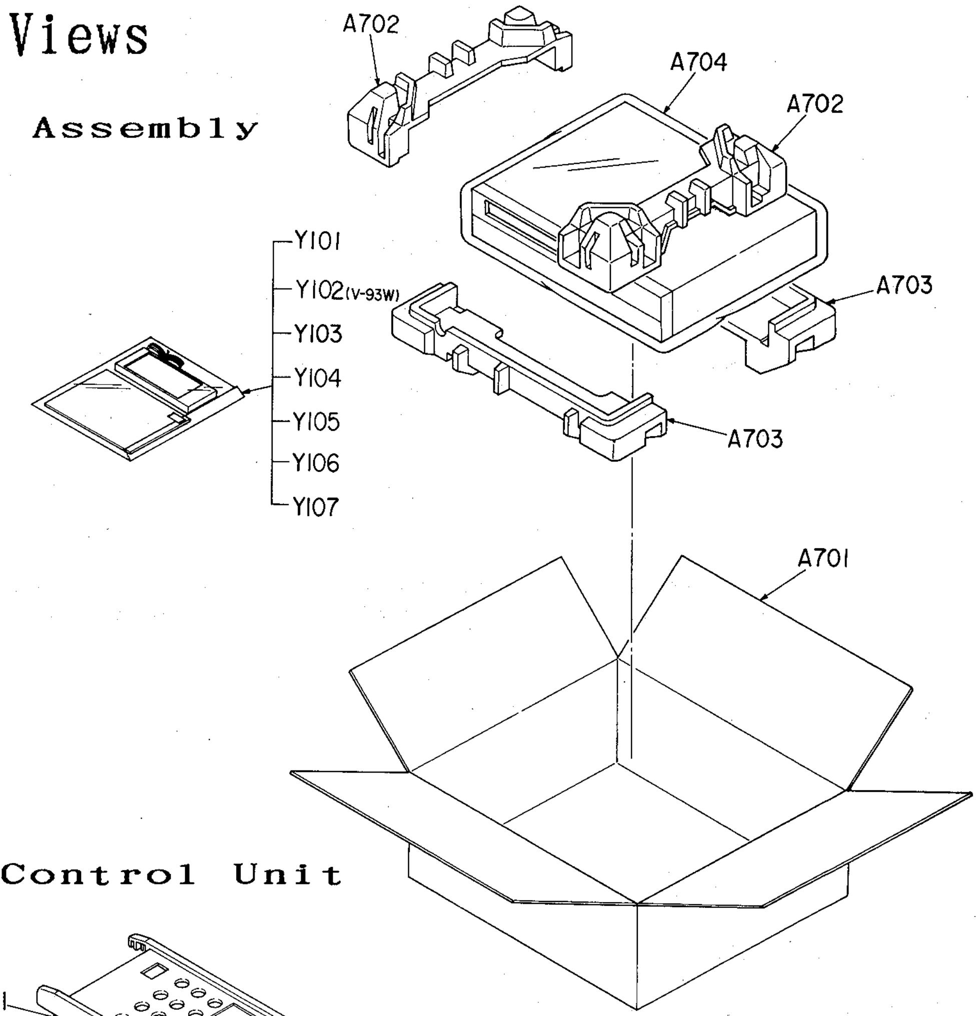
   All resistance values are in ohms.
   K . . . . . . Kilo (1000)
   M . . . . . . Mega (1000000)
   W . . . . . . Watt

4. Tolerance

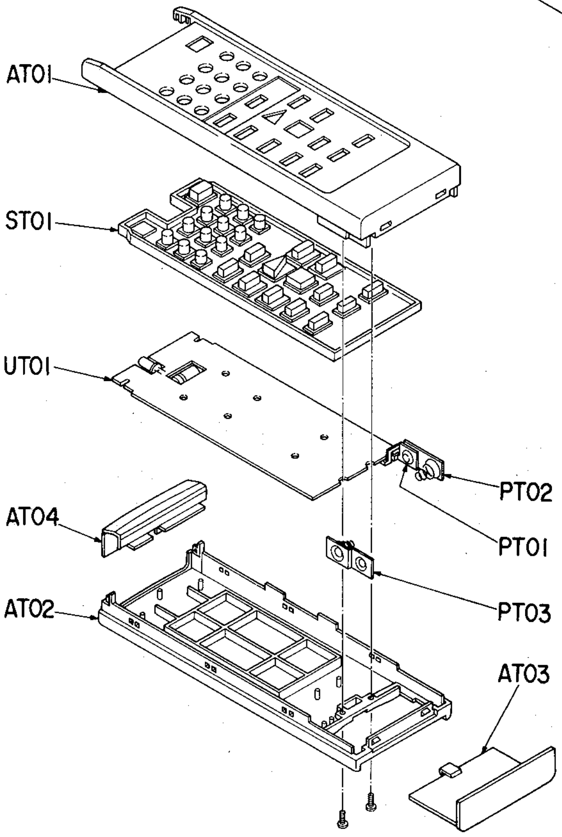
Symbol	F	G	J	K	M	N	Z	P	A
%	±1	±2	±5	±10	±20	±30	+80 -20	+100 -0	+100 -10

1.Exploded Views

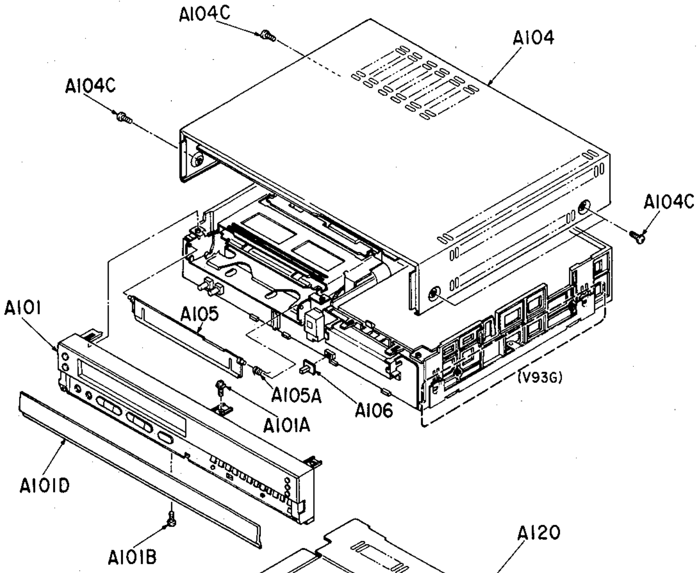
(1) Packing Assembly


A702
A704
A702
Y101
Y102(V-93W)
Y103
Y104
Y105
Y106
Y107
A703
A703
A701

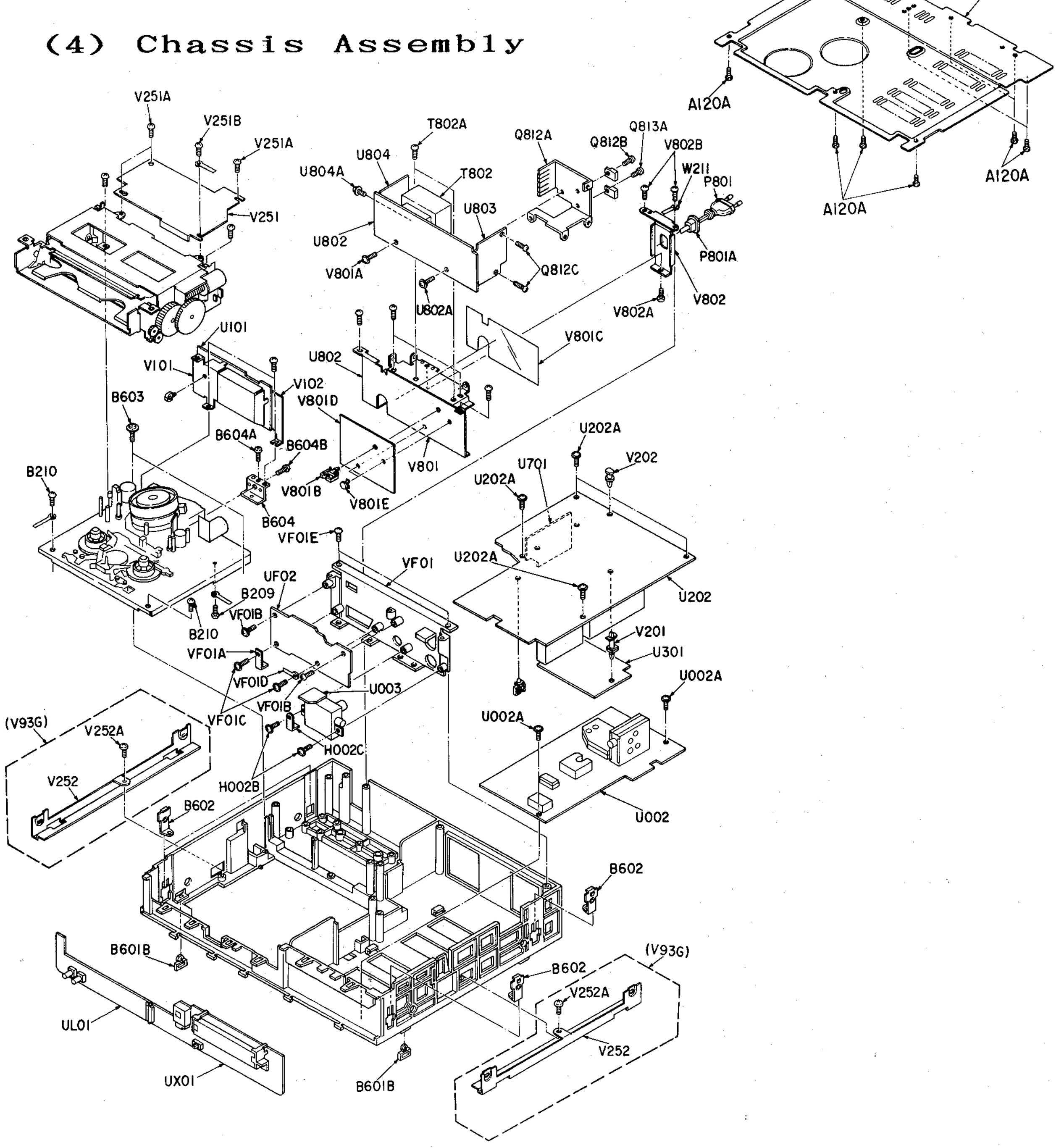
(2) Remote Control Unit


AT01
ST01
UT01
PT02
AT04
PT01
PT03
AT02
AT03

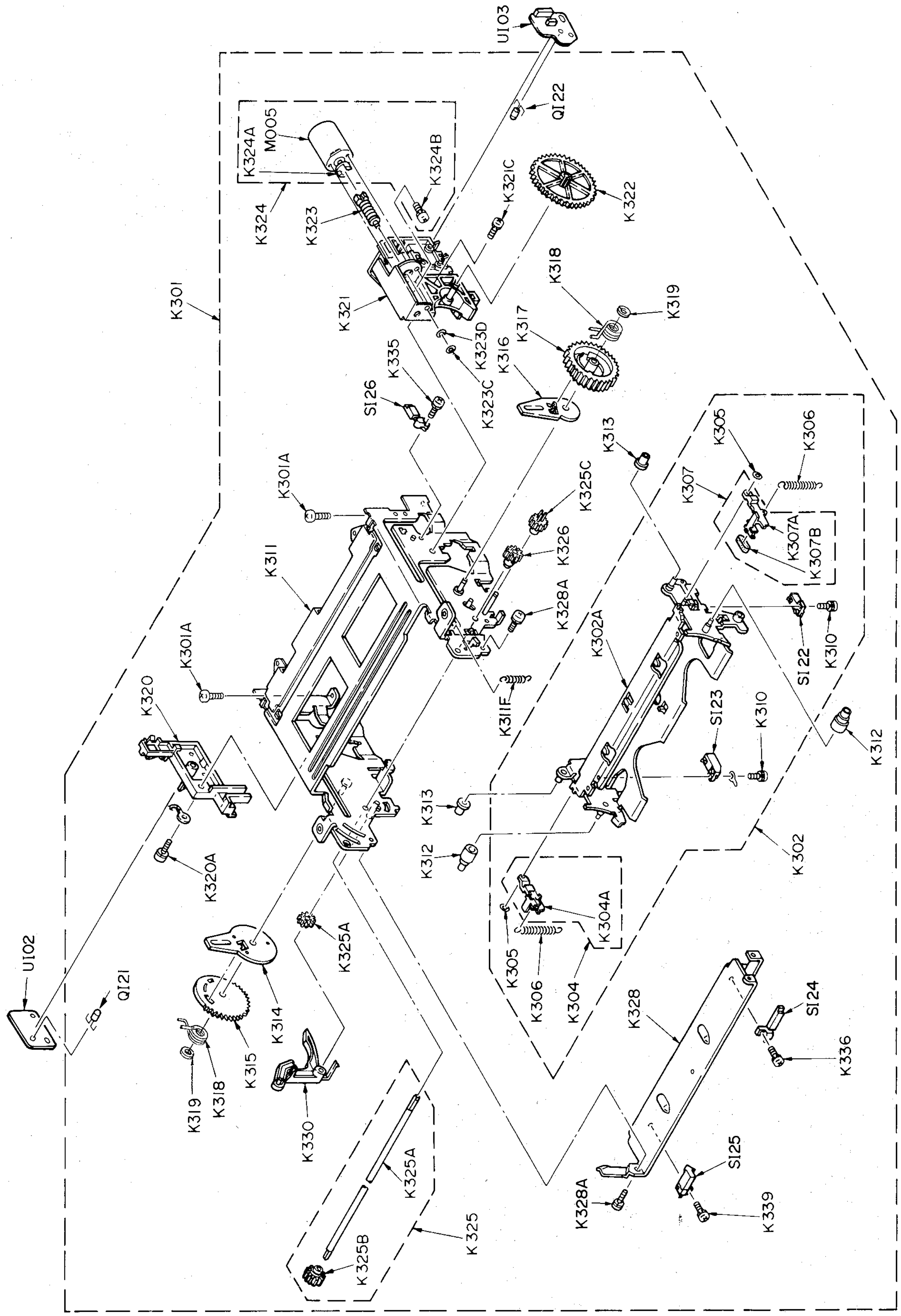
(3) Cabinet Assembly


A104C
A104
A104C
A104C
A101
A105
A105A
A106
(V93G)
A101A
A101D
A101B

(4) Chassis Assembly

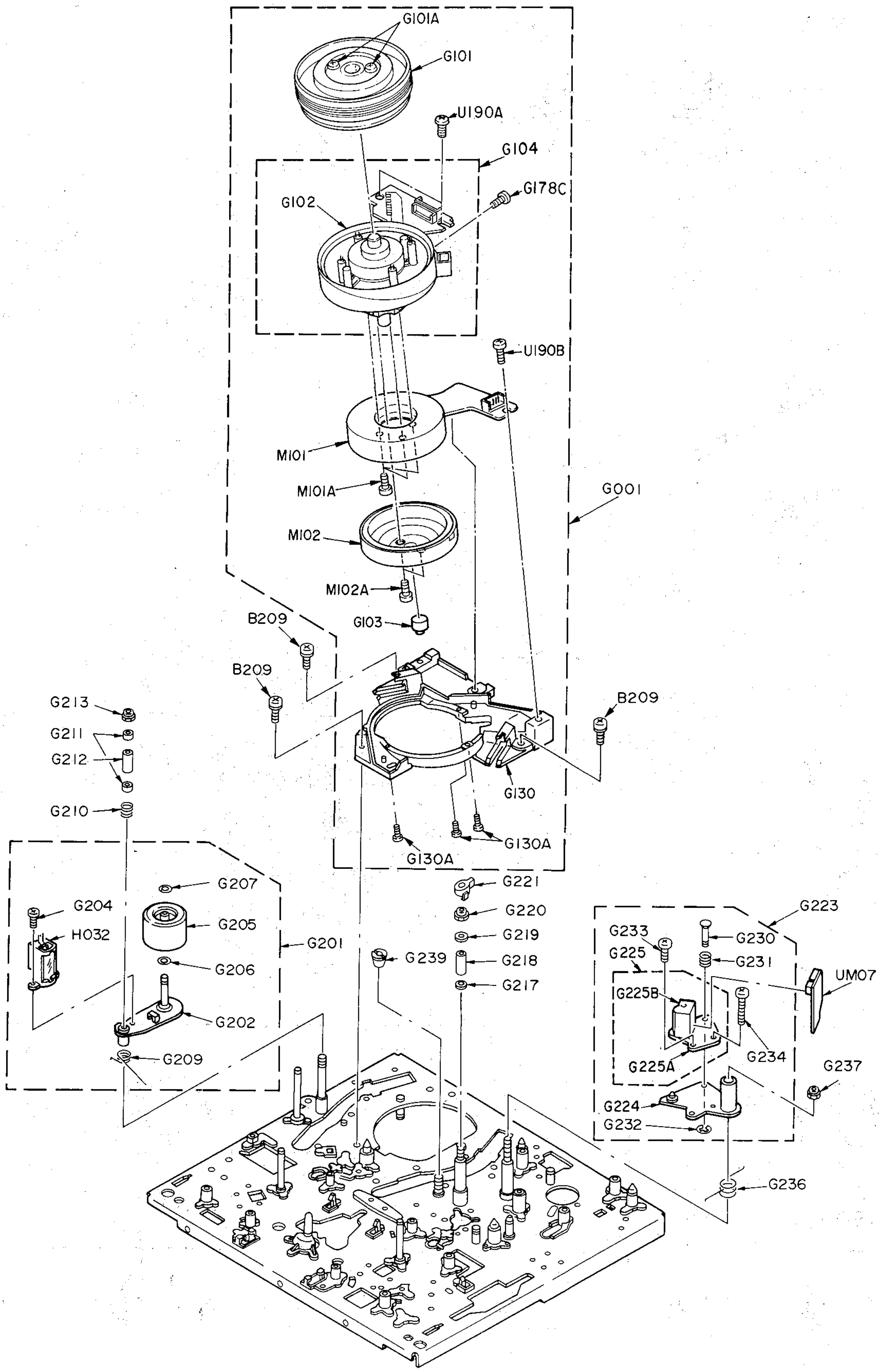

A120
A120A
A120A
A120A
V251A
V251B
V251A
V251
T802A
U804
U804A
T802
Q812A
Q812B
Q813A
V802B
W211
P801
U803
U802
V801A
Q812C
P801A
U802A
V802A
V802
U101
V801C
V101
U802
V102
V801D
B603
B604A
B604B
V801
V801B
V801E
B604
B210
U202A
U701
V202
U202A
VF01E
VF01
U202A
U202
UF02
B209
VF01B
B210
VF01A
V201
U301
VF01D
U003
VF01B
VF01C
U002A
U002A
H002C
H002B
(V93G)
V252A
V252
B602
U002
B602
B601B
B602
(V93G)
V252A
UL01
V252
UX01
B601B

(5) Cassette Holder Assembly



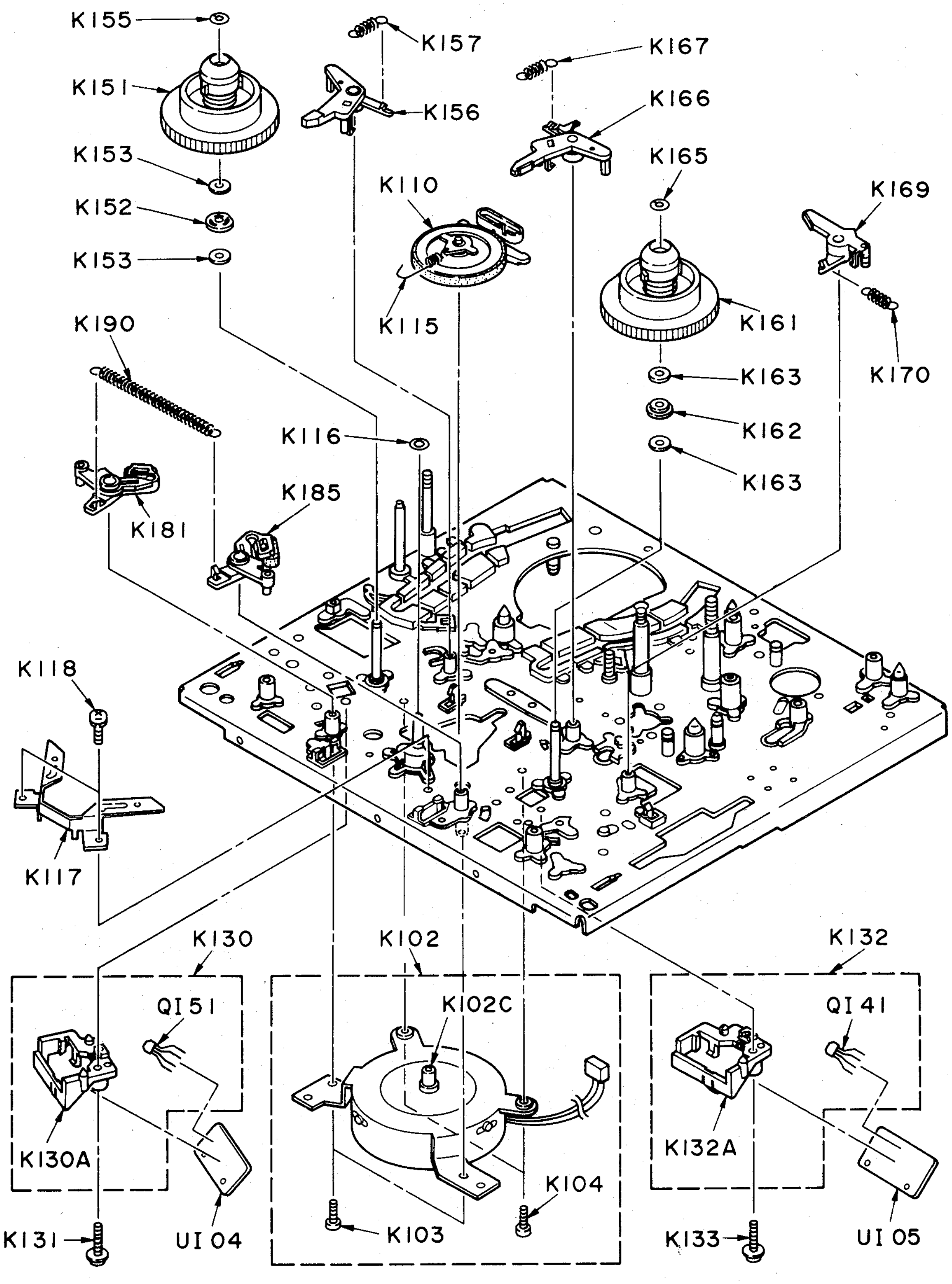
U103
QI22
K324A
M005
K324B
K324
K323
K321C
K322
K301
K321
K318
K319
K323D
K317
K335
K323C
K316
SI26
K305
K306
K313
K301A
K325C
K307
K311
K326
K307A
K307B
K328A
K302A
K301A
SI22
K310
K311F
K320
SI23
K310
K312
K313
K302
K312
K320A
K304A
UI02
K325A
QI21
K305
K306
K304
K328
SI24
K314
K315
K336
K319
K318
K330
K325A
SI25
K328A
K339
K325
K325B

(6) Mechanical Parts (1)

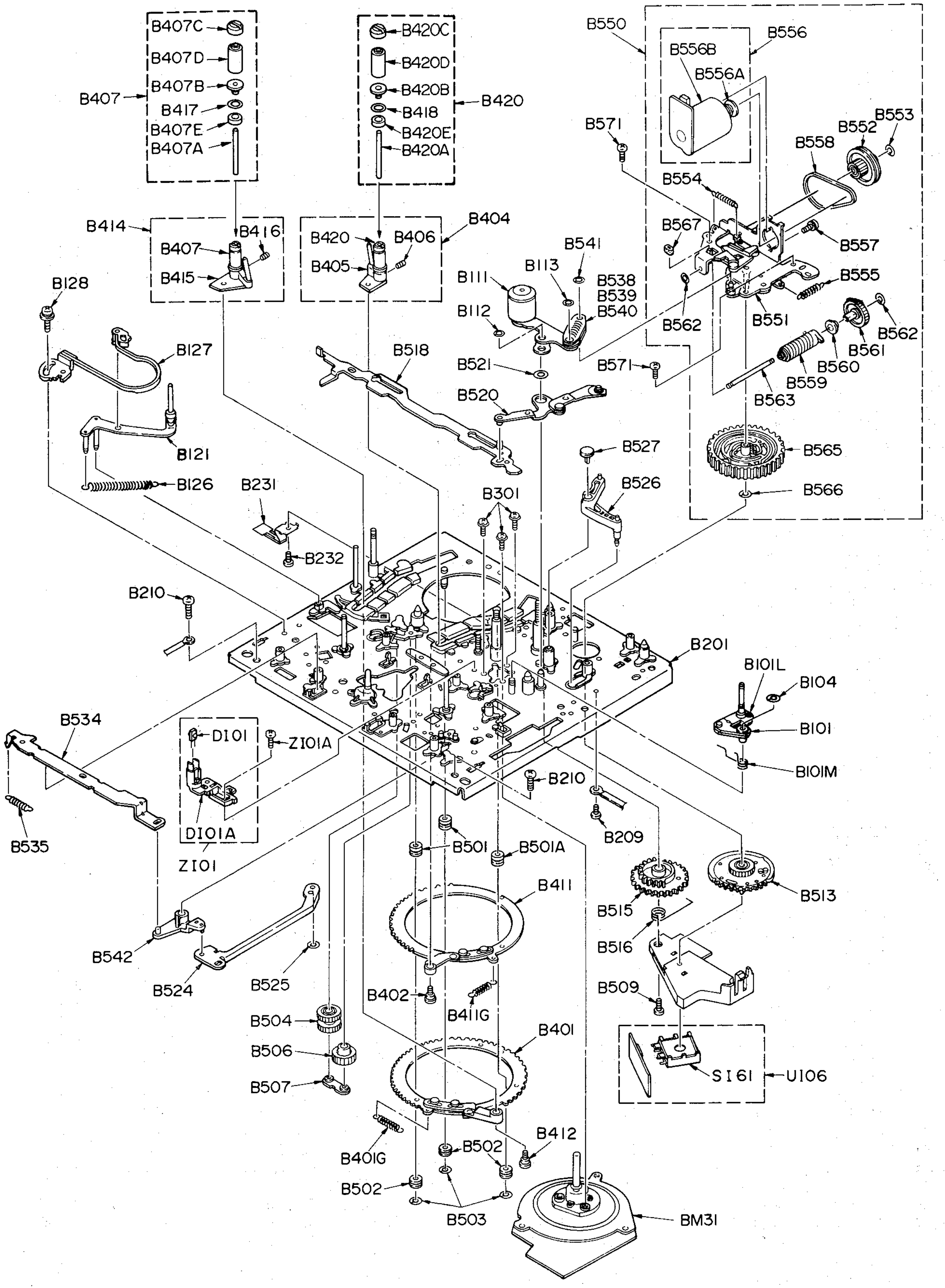


G101A
G101
U190A
G104
G178C
G102
U190B
M101
M101A
G001
M102
M102A
G103
B209
B209
B209
G213
G211
G212
G210
G130
G130A
G130A
G207
G204
G205
H032
G201
G206
G202
G209
G221
G220
G219
G239
G218
G217
G223
G233
G230
G225
G231
UM07
G225B
G234
G225A
G237
G224
G232
G236

(7) Mechanical Parts (2)


K155
K157
K167
K151
K156
K166
K153
K165
K110
K169
K152
K153
K161
K190
K115
K170
K163
K162
K116
K163
K185
K181
K118
K117
K130
K102
K132
QI51
K102C
QI41
K130A
K132A
K104
K131
UI04
K103
K133
UI05

(8) Mechanical Parts (3)


B407C
B407D
B407B
B407
B417
B407E
B407A
B420C
B420D
B420B
B420
B418
B420E
B420A
B550
B556
B556B
B556A
B571
B553
B552
B558
B554
B414
B416
B407
B415
B420
B406
B405
B404
B541
B567
B557
B113
B111
B538
B539
B540
B555
B128
B112
B562
B551
B562
B561
B127
B518
B521
B571
B560
B559
B563
B520
B565
B527
B121
B526
B566
B126
B231
B301
B232
B210
B201
B101L
B104
B534
D101
Z101A
B101
B101M
B210
B209
D101A
B535
Z101
B501
B501A
B411
B513
B515
B542
B516
B524
B525
B509
B402
B504
B411G
B401
B506
S161
U106
B507
B412
B401G
B502
B502
B503
BM31

2.Parts List

ELECTRICAL PARTS

LOCATION NUMBER	PART NUMBER	DESCRIPTION		
U002	70197816	P C Board Assy, PIF, TIMER2, VPS, V-93G		

INTEGRATED CIRCUITS

IC002	23119143	IC	M51365SP	
ICA01	70119879	IC	TMP47C231AN4956	
ICA02	70119517	IC	M58659P	
ICA03	23119441	IC	LA7910	
ICA04	B0272490	IC	TD6305	
ICA12	B0372960	IC	TA78L009AP	
ICL63	70119577	IC	PST520D	
ICX64	70119880	IC	TMP47C410AN6696	
ICX65	70119891	IC	SAF1135P	
ICX66	70119890	IC	SAA5235	
ICX67	70119413	IC	PST520C	

TRANSISTORS

Q001	A6708871	Transistor	2SC388ATM	
Q003	A6534430	Transistor	2SA1048-Y	
Q004	A6332430	Transistor	2SC2458-Y	
Q007	A6534430	Transistor	2SA1048-Y	
Q008	A6002010	Transistor	RN1201	
Q009	A6317440	Transistor	2SC1815-Y	
Q010	A6002020	Transistor	RN1202	
Q011	A6342200	Transistor	2SC2878A	
QA06	A6041876	Transistor, FET	2SK117-GRFA2	
QA07	A6332430	Transistor	2SC2458-Y	
QA08	A6002060	Transistor	RN1206	
QA09	A6546320	Transistor	2SA1297GR	
QL60	A6002060	Transistor	RN1206	
QL61	A6002060	Transistor	RN1206	
QL62	A6002040	Transistor	RN1204	
QX61	A6002040	Transistor	RN1204	
QX63	A6534430	Transistor	2SA1048-Y	

DIODES

D001	A7160570	Diode	1SS176	
DA01	70115382	Diode, Zener	MA1330-M	
DA02	A7160590	Diode	1SS177	
DL61	A7160590	Diode	1SS177	
DL62	A7160590	Diode	1SS177	
DL63	A7160590	Diode	1SS177	
DL64	A7160590	Diode	1SS177	
DL65	A7110017	Diode, Zener	05Z 5. 6-Y	

COILS

L001	23261986	Coil, Choke	TRF9220	
L002	23261985	Coil, Choke	TRF9221	
L003	23262745	Coil, IF	TRF1132	
L004	23238912	Coil, Peaking	TRF4680AC	
L005	23237988	Coil, Peaking	TRF4829AC	
L006	23238921	Coil, Peaking	TRF4120AC	
L008	23237977	Coil, Peaking	TRF4680AC	
L009	23237976	Coil, Peaking	TRF4820AC	
L051	23262783	Coil, IF	TRF1105	
L052	23262813	Coil, IF	TRF1077D	
L053	23262748	Coil, IF	TRF1135K	
L054	23262753	Coil, IF	TRF1136K	
LA01	23238912	Coil, Peaking	TRF4680AC	
LA02	23238653	Coil, Peaking	TRF4470AI	
LL60	23238653	Coil, Peaking	TRF4470AI	
LX60	23237987	Coil, Peaking	TRF4100AC	

CAPACITORS

C001	24474103	Cap, Ceramic	0. 01MF	N 50V
C002	24474103	Cap, Ceramic	0. 01MF	N 50V
C003	24474103	Cap, Ceramic	0. 01MF	N 50V
C004	24474103	Cap, Ceramic	0. 01MF	N 50V
C005	24538124	Cap, Plastic	0. 12MF	J 50V
C006	24206229	Cap, Electrolytic	2. 2MF	M 50V
C007	24206229	Cap, Electrolytic	2. 2MF	M 50V
C008	24474103	Cap, Ceramic	0. 01MF	N 50V
C009	24203470	Cap, Electrolytic	47MF	M 16V
C010	24474103	Cap, Ceramic	0. 01MF	N 50V
C011	24203100	Cap, Electrolytic	10MF	M 16V
C012	24474103	Cap, Ceramic	0. 01MF	N 50V
C013	24203220	Cap, Electrolytic	22MF	M 16V
C014	24474103	Cap, Ceramic	0. 01MF	N 50V
C015	24203470	Cap, Electrolytic	47MF	M 16V
C016	24474103	Cap, Ceramic	0. 01MF	N 50V
C017	24203100	Cap, Electrolytic	10MF	M 16V
C018	24206478	Cap, Electrolytic	0. 47MF	M 50V
C019	24206010	Cap, Electrolytic	1MF	M 50V
C020	24591473	Cap, Plastic	0. 047MF	J 50V
C021	24206010	Cap, Electrolytic	1MF	M 50V
C022	24203470	Cap, Electrolytic	47MF	M 16V
C023	24851102	Cap, Ceramic	1000PF	K 25V
C024	24851102	Cap, Ceramic	1000PF	K 25V
C028	24474103	Cap, Ceramic	0. 01MF	N 50V
C029	24473470	Cap, Ceramic	47PF	J 50V
C030	24473470	Cap, Ceramic	47PF	J 50V
C031	24538104	Cap, Plastic	0. 1MF	J 50V
C032	24473120	Cap, Ceramic	12PF	J 50V
C033	24591392	Cap, Plastic	3900PF	J 50V
C034	24203100	Cap, Electrolytic	10MF	M 16V
C035	24203470	Cap, Electrolytic	47MF	M 16V
C036	24353100	Cap, Ceramic	10PF	J 50V
C038	24538103	Cap, Plastic	0. 01MF	J 50V
C039	24357820	Cap, Ceramic	82PF	J 50V
C040	24357040	Cap, Ceramic	4PF	J 50V
C041	24357040	Cap, Ceramic	4PF	J 50V
CA01	24206100	Cap, Electrolytic	10MF	M 50V
CA02	24203100	Cap, Electrolytic	10MF	M 16V
CA03	24474103	Cap, Ceramic	0. 01MF	N 50V
CA04	24203100	Cap, Electrolytic	10MF	M 16V
CA05	24474103	Cap, Ceramic	0. 01MF	N 50V
CA06	24232223	Cap, Ceramic	0. 022MF	Z 50V
CA07	24473300	Cap, Ceramic	30PF	J 50V
CA08	24473300	Cap, Ceramic	30PF	J 50V
CA09	24202330	Cap, Electrolytic	33MF	M 10V
CA10	24474103	Cap, Ceramic	0. 01MF	N 50V
CA11	24474102	Cap, Ceramic	1000PF	K 50V
CA12	24473240	Cap, Ceramic	24PF	J 50V
CA13	24473240	Cap, Ceramic	24PF	J 50V
CA14	24474102	Cap, Ceramic	1000PF	K 50V
CA15	24474103	Cap, Ceramic	0. 01MF	N 50V
CA16	24591103	Cap, Plastic	0. 01MF	J 50V
CA17	24591104	Cap, Plastic	0. 1MF	J 50V
CA22	24203100	Cap, Electrolytic	10MF	M 16V
CL60	24793222	Cap, Electrolytic	2200MF	M 10V
CL61	24636010	Cap, Electrolytic	1MF	M 50V
CL62	24795470	Cap, Electrolytic	47MF	M 25V
CL63	24795221	Cap, Electrolytic	220MF	M 25V
CX61	24202101	Cap, Electrolytic	100MF	M 10V
CX62	24474103	Cap, Ceramic	0. 01MF	N 50V
CX63	24473390	Cap, Ceramic	39PF	J 50V
CX64	24473390	Cap, Ceramic	39PF	J 50V
CX65	24202101	Cap, Electrolytic	100MF	M 10V
CX66	24474103	Cap, Ceramic	0. 01MF	N 50V
CX70	24538683	Cap, Plastic	0. 068MF	J 50V
CX71	24203101	Cap, Electrolytic	100MF	M 16V
CX72	24474103	Cap, Ceramic	0. 01MF	N 50V
CX73	24538474	Cap, Plastic	0. 47MF	J 50V
CX74	24474102	Cap, Ceramic	1000PF	K 50V
CX75	24472150	Cap, Ceramic	15PF	J 50V
CX76	24474102	Cap, Ceramic	1000PF	K 50V
CX77	24474471	Cap, Ceramic	470PF	K 50V
CX78	24538223	Cap, Plastic	0. 022MF	J 50V
CX79	24474271	Cap, Ceramic	270PF	K 50V
CX80	24474101	Cap, Ceramic	100PF	K 50V
CX81	24473150	Cap, Ceramic	15PF	J 50V
CX82	24474820	Cap, Ceramic	82PF	K 50V
CX83	24474103	Cap, Ceramic	0. 01MF	N 50V

RESISTORS

R001	24366151	Res, Carbon	150	J 1/6W
R002	24366101	Res, Carbon	100	J 1/6W
R003	24366272	Res, Carbon	2. 7K	J 1/6W
R004	24366102	Res, Carbon	1K	J 1/6W
R005	24366621	Res, Carbon	620	J 1/6W
R006	24366270	Res, Carbon	27	J 1/6W
R007	24366102	Res, Carbon	1K	J 1/6W
R008	24366474	Res, Carbon	470K	J 1/6W
R010	24366164	Res, Carbon	160K	J 1/6W

LOCATION NUMBER	PART NUMBER	DESCRIPTION		
R011	24366221	Res, Carbon	220	J 1/6W
R012	24366473	Res, Carbon	47K	J 1/6W
R013	24366330	Res, Carbon	33	J 1/6W
R014	24366561	Res, Carbon	560	J 1/6W
R015	24366224	Res, Carbon	220K	J 1/6W
R016	24366244	Res, Carbon	240K	J 1/6W
R017	24366224	Res, Carbon	220K	J 1/6W
R018	24366474	Res, Carbon	470K	J 1/6W
R019	24366334	Res, Carbon	330K	J 1/6W
R020	24366105	Res, Carbon	1M	J 1/6W
R021	24366471	Res, Carbon	470	J 1/6W
R022	24366204	Res, Carbon	200K	J 1/6W
R026	24366511	Res, Carbon	510	J 1/6W
R027	24366242	Res, Carbon	2. 4K	J 1/6W
R032	24366432	Res, Carbon	4. 3K	J 1/6W
R033	24366132	Res, Carbon	1. 3K	J 1/6W
R034	24366181	Res, Carbon	180	J 1/6W
R035	24366562	Res, Carbon	5. 6K	J 1/6W
R036	24366392	Res, Carbon	3. 9K	J 1/6W
R037	24366222	Res, Carbon	2. 2K	J 1/6W
R038	24366222	Res, Carbon	2. 2K	J 1/6W
R039	24366272	Res, Carbon	2. 7K	J 1/6W
R040	24366121	Res, Carbon	120	J 1/6W
R041	24366221	Res, Carbon	220	J 1/6W
R042	24366471	Res, Carbon	470	J 1/6W
R043	24366331	Res, Carbon	330	J 1/6W
R044	24366752	Res, Carbon	7. 5K	J 1/6W
R045	24366471	Res, Carbon	470	J 1/6W
R046	24366681	Res, Carbon	680	J 1/6W
R047	24366183	Res, Carbon	18K	J 1/6W
R051	24066983	Res, Variable	5K	
R060	24366331	Res, Carbon	330	J 1/6W
R063	24366680	Res, Carbon	68	J 1/6W
RA01	24366102	Res, Carbon	1K	J 1/6W
RA02	24366102	Res, Carbon	1K	J 1/6W
RA03	24366102	Res, Carbon	1K	J 1/6W
RA04	24366102	Res, Carbon	1K	J 1/6W
RA05	24366201	Res, Carbon	200	J 1/6W
RA06	24366151	Res, Carbon	150	J 1/6W
RA07	24366562	Res, Carbon	5. 6K	J 1/6W
RA09	24366392	Res, Carbon	3. 9K	J 1/6W
RA10	24366152	Res, Carbon	1. 5K	J 1/6W
RA11	24366181	Res, Carbon	180	J 1/6W
RA12	24366393	Res, Carbon	39K	J 1/6W
RA13	24366273	Res, Carbon	27K	J 1/6W
RA14	24366334	Res, Carbon	330K	J 1/6W
RA15	24366562	Res, Carbon	5. 6K	J 1/6W
RA16	24366682	Res, Carbon	6. 8K	J 1/6W
RA17	24366682	Res, Carbon	6. 8K	J 1/6W
RA18	24366103	Res, Carbon	10K	J 1/6W
RA19	24366102	Res, Carbon	1K	J 1/6W
RA24	24366102	Res, Carbon	1K	J 1/6W
RA25	24366472	Res, Carbon	4. 7K	J 1/6W
RA28	24366103	Res, Carbon	10K	J 1/6W
RA29	24366103	Res, Carbon	10K	J 1/6W
RA30	24552102	Res, Oxide Metal	1K	J 1/2W
RA31	24366221	Res, Carbon	220	J 1/6W
RA32	24366221	Res, Carbon	220	J 1/6W
RA33	24366221	Res, Carbon	220	J 1/6W
RA34	24366103	Res, Carbon	10K	J 1/6W
RA35	24366103	Res, Carbon	10K	J 1/6W
RA36	24366103	Res, Carbon	10K	J 1/6W
RA37	24366101	Res, Carbon	100	J 1/6W
RL61	24366103	Res, Carbon	10K	J 1/6W
RL62	24366472	Res, Carbon	4. 7K	J 1/6W
RL63	24366473	Res, Carbon	47K	J 1/6W
RL64	24366152	Res, Carbon	1. 5K	J 1/6W
RL65	24366151	Res, Carbon	150	J 1/6W
RL66	24366151	Res, Carbon	150	J 1/6W
RL67	24552391	Res, Oxide Metal	390	J 1/2W
RX64	24366183	Res, Carbon	18K	J 1/6W
RX65	24366183	Res, Carbon	18K	J 1/6W
RX66	24366103	Res, Carbon	10K	J 1/6W
RX67	24366103	Res, Carbon	10K	J 1/6W
RX68	24366103	Res, Carbon	10K	J 1/6W
RX69	24366103	Res, Carbon	10K	J 1/6W
RX70	24366103	Res, Carbon	10K	J 1/6W
RX71	24366101	Res, Carbon	100	J 1/6W
RX72	24366101	Res, Carbon	100	J 1/6W
RX73	24366101	Res, Carbon	100	J 1/6W
RX74	24366101	Res, Carbon	100	J 1/6W
RX75	24366101	Res, Carbon	100	J 1/6W
RX76	24366101	Res, Carbon	100	J 1/6W
RX77	24366101	Res, Carbon	100	J 1/6W
RX78	24366103	Res, Carbon	10K	J 1/6W
RX79	24366103	Res, Carbon	10K	J 1/6W
RX80	24366103	Res, Carbon	10K	J 1/6W
RX81	24366222	Res, Carbon	2. 2K	J 1/6W

MISCELLANEOUS

PA01	70163071	Phono Jack
XA01	23153969	Crystal
XA02	23153847	Resonator, 4MHz, TCR1014
XX60	23153847	Resonator, 4MHz, TCR1014
XX61	23153763	Crystal
Z001	A5611190	Filter, 38. 9MHz, F1037
Z002	23107915	Filter, TCF1017
Z003	23107947	Filter, SIF, 5. 5MHz
Z004	23107740	Filter, TCF1049
Z802	23107672	DC-DC Converter, Z-802
ZA02	24000760	Resistor Block, 10k x 10
ZA03	24000766	Resistor Block, 10Kx4
ZL62	23118132	IC Protector
U002	70197880	P C Board Assy, PIF, TIMER 2, V-93W

INTEGRATED CIRCUITS

IC002	23119143	IC	M51365SP
ICA01	70119879	IC	TMP47C231AN4956
ICA02	70119517	IC	M58659P
ICA03	23119441	IC	LA7910
ICA04	B0272490	IC	TD6305
ICL63	70119577	IC	PST520D

TRANSISTORS

Q001	A6708871	Transistor	2SC388ATM
Q003	A6534430	Transistor	2SA1048-Y
Q004	A6332430	Transistor	2SC2458-Y
Q007	A6534430	Transistor	2SA1048-Y
Q008	A6002010	Transistor	RN1201
Q009	A6317440	Transistor	2SC1815-Y
Q010	A6002020	Transistor	RN1202
Q011	A6342200	Transistor	2SC2878A
QA06	A6041876	Transistor, FET	2SK117-GRFA2
QA07	A6332430	Transistor	2SC2458-Y
QA08	A6002060	Transistor	RN1206
QA11	A6546320	Transistor	2SA1297GR
QL60	A6002060	Transistor	RN1206
QL61	A6002060	Transistor	RN1206
QL62	A6002040	Transistor	RN1204

DIODES

D001	A7160570	Diode	1SS176
DA01	70115382	Diode, Zener	MA1330-M
DA02	A7160590	Diode	1SS177
DL61	A7160590	Diode	1SS177
DL62	A7160590	Diode	1SS177
DL63	A7160590	Diode	1SS177
DL64	A7160590	Diode	1SS177
DL65	A7110017	Diode, Zener	05Z 5. 6-Y

COILS

L001	23261986	Coil, Choke	TRF9220
L002	23261986	Coil, Choke	TRF9220
L003	23262745	Coil, IF	TRF1132
L004	23238912	Coil, Peaking	TRF4680AC
L005	23237988	Coil, Peaking	TRF4829AC
L006	23238921	Coil, Peaking	TRF4120AC
L008	23237976	Coil, Peaking	TRF4820AC
L051	23262783	Coil, IF	TRF1105
L052	23262813	Coil, IF	TRF1077D
LA01	23238912	Coil, Peaking	TRF4680AC
LA02	23238653	Coil, Peaking	TRF4470AI
LL60	23238653	Coil, Peaking	TRF4470AI

CAPACITORS

LOCATION NUMBER	PART NUMBER	DESCRIPTION		
C001	24474103	Cap, Ceramic	0. 01MF	N 50V
C002	24474103	Cap, Ceramic	0. 01MF	N 50V
C003	24474103	Cap, Ceramic	0. 01MF	N 50V
C004	24474103	Cap, Ceramic	0. 01MF	N 50V
C005	24206478	Cap, Electrolytic	0. 47MF	M 50V
C006	24206229	Cap, Electrolytic	2. 2MF	M 50V
C007	24206229	Cap, Electrolytic	2. 2MF	M 50V
C008	24474103	Cap, Ceramic	0. 01MF	N 50V
C009	24203470	Cap, Electrolytic	47MF	M 16V
C010	24474103	Cap, Ceramic	0. 01MF	N 50V
C011	24203100	Cap, Electrolytic	10MF	M 16V
C012	24474103	Cap, Ceramic	0. 01MF	N 50V
C013	24203220	Cap, Electrolytic	22MF	M 16V
C014	24474103	Cap, Ceramic	0. 01MF	N 50V
C015	24203470	Cap, Electrolytic	47MF	M 16V
C016	24474103	Cap, Ceramic	0. 01MF	N 50V
C017	24203100	Cap, Electrolytic	10MF	M 16V
C018	24206478	Cap, Electrolytic	0. 47MF	M 50V
C019	24206010	Cap, Electrolytic	1MF	M 50V
C020	24591473	Cap, Plastic	0. 047MF	J 50V
C021	24206010	Cap, Electrolytic	1MF	M 50V
C022	24203470	Cap, Electrolytic	47MF	M 16V
C023	24851102	Cap, Ceramic	1000PF	K 25V
C024	24851102	Cap, Ceramic	1000PF	K 25V
C026	24473680	Cap, Ceramic	68PF	J 50V
C028	24474103	Cap, Ceramic	0. 01MF	N 50V
C029	24473470	Cap, Ceramic	47PF	J 50V
C030	24473470	Cap, Ceramic	47PF	J 50V
C031	24538104	Cap, Plastic	0. 1MF	J 50V
C032	24473120	Cap, Ceramic	12PF	J 50V
C033	24591392	Cap, Plastic	3900PF	J 50V
C034	24203100	Cap, Electrolytic	10MF	M 16V
C035	24203470	Cap, Electrolytic	47MF	M 16V
C036	24353090	Cap, Ceramic	9PF	J 50V
CA01	24206100	Cap, Electrolytic	10MF	M 50V
CA02	24203100	Cap, Electrolytic	10MF	M 16V
CA03	24474103	Cap, Ceramic	0. 01MF	N 50V
CA04	24203100	Cap, Electrolytic	10MF	M 16V
CA05	24474103	Cap, Ceramic	0. 01MF	N 50V
CA06	24232223	Cap, Ceramic	0. 022MF	Z 50V
CA07	24473300	Cap, Ceramic	30PF	J 50V
CA08	24473300	Cap, Ceramic	30PF	J 50V
CA09	24202330	Cap, Electrolytic	33MF	M 10V
CA10	24474103	Cap, Ceramic	0. 01MF	N 50V
CA11	24474102	Cap, Ceramic	1000PF	K 50V
CA12	24473240	Cap, Ceramic	24PF	J 50V
CA13	24473240	Cap, Ceramic	24PF	J 50V
CA14	24474102	Cap, Ceramic	1000PF	K 50V
CA15	24474103	Cap, Ceramic	0. 01MF	N 50V
CA16	24591103	Cap, Plastic	0. 01MF	J 50V
CA17	24591104	Cap, Plastic	0. 1MF	J 50V
CA22	24203100	Cap, Electrolytic	10MF	M 16V
CL60	24793222	Cap, Electrolytic	2200MF	M 10V
CL61	24636010	Cap, Electrolytic	1MF	M 50V
CL62	24795470	Cap, Electrolytic	47MF	M 25V
CL63	24795221	Cap, Electrolytic	220MF	M 25V

RESISTORS

LOCATION NUMBER	PART NUMBER	DESCRIPTION		
R001	24366101	Res, Carbon	100	J 1/6W
R002	24366101	Res, Carbon	100	J 1/6W
R003	24366272	Res, Carbon	2. 7K	J 1/6W
R004	24366102	Res, Carbon	1K	J 1/6W
R005	24366471	Res, Carbon	470	J 1/6W
R006	24366270	Res, Carbon	27	J 1/6W
R007	24366102	Res, Carbon	1K	J 1/6W
R008	24366824	Res, Carbon	820K	J 1/6W
R010	24366164	Res, Carbon	160K	J 1/6W
R011	24366221	Res, Carbon	220	J 1/6W
R012	24366473	Res, Carbon	47K	J 1/6W
R013	24366330	Res, Carbon	33	J 1/6W
R014	24366561	Res, Carbon	560	J 1/6W
R015	24366224	Res, Carbon	220K	J 1/6W
R016	24366244	Res, Carbon	240K	J 1/6W
R017	24366224	Res, Carbon	220K	J 1/6W
R018	24366474	Res, Carbon	470K	J 1/6W
R019	24366334	Res, Carbon	330K	J 1/6W
R020	24366105	Res, Carbon	1M	J 1/6W
R021	24366471	Res, Carbon	470	J 1/6W
R022	24366204	Res, Carbon	200K	J 1/6W
R026	24366511	Res, Carbon	510	J 1/6W
R027	24366242	Res, Carbon	2. 4K	J 1/6W
R032	24366432	Res, Carbon	4. 3K	J 1/6W
R033	24366132	Res, Carbon	1. 3K	J 1/6W
R034	24366161	Res, Carbon	160	J 1/6W
R035	24366562	Res, Carbon	5. 6K	J 1/6W
R036	24366392	Res, Carbon	3. 9K	J 1/6W
R037	24366222	Res, Carbon	2. 2K	J 1/6W
R038	24366222	Res, Carbon	2. 2K	J 1/6W
R039	24366272	Res, Carbon	2. 7K	J 1/6W
R040	24366121	Res, Carbon	120	J 1/6W
R041	24366331	Res, Carbon	330	J 1/6W
R042	24366471	Res, Carbon	470	J 1/6W
R043	24366331	Res, Carbon	330	J 1/6W
R044	24366752	Res, Carbon	7. 5K	J 1/6W
R045	24366471	Res, Carbon	470	J 1/6W
R046	24366681	Res, Carbon	680	J 1/6W
R047	24366183	Res, Carbon	18K	J 1/6W
R051	24066983	Res, Variable	5K	
R060	24366111	Res, Carbon	110	J 1/6W
RA01	24366102	Res, Carbon	1K	J 1/6W
RA02	24366102	Res, Carbon	1K	J 1/6W
RA03	24366102	Res, Carbon	1K	J 1/6W
RA04	24366102	Res, Carbon	1K	J 1/6W
RA05	24366201	Res, Carbon	200	J 1/6W
RA06	24366151	Res, Carbon	150	J 1/6W
RA07	24366562	Res, Carbon	5. 6K	J 1/6W
RA09	24366392	Res, Carbon	3. 9K	J 1/6W
RA10	24366152	Res, Carbon	1. 5K	J 1/6W
RA11	24366181	Res, Carbon	180	J 1/6W
RA12	24366393	Res, Carbon	39K	J 1/6W
RA13	24366273	Res, Carbon	27K	J 1/6W
RA14	24366334	Res, Carbon	330K	J 1/6W
RA15	24366562	Res, Carbon	5. 6K	J 1/6W
RA16	24366682	Res, Carbon	6. 8K	J 1/6W
RA17	24366682	Res, Carbon	6. 8K	J 1/6W
RA21	24366103	Res, Carbon	10K	J 1/6W
RA22	24366751	Res, Carbon	750	J 1/6W
RA24	24366102	Res, Carbon	1K	J 1/6W
RA25	24366472	Res, Carbon	4. 7K	J 1/6W
RA28	24366103	Res, Carbon	10K	J 1/6W
RA29	24366103	Res, Carbon	10K	J 1/6W
RA30	24552102	Res, Oxide Metal	1K	J 1/2W
RA31	24366221	Res, Carbon	220	J 1/6W
RA32	24366221	Res, Carbon	220	J 1/6W
RA33	24366221	Res, Carbon	220	J 1/6W
RA34	24366103	Res, Carbon	10K	J 1/6W
RA35	24366103	Res, Carbon	10K	J 1/6W
RA36	24366103	Res, Carbon	10K	J 1/6W
RA37	24366101	Res, Carbon	100	J 1/6W
RL61	24366103	Res, Carbon	10K	J 1/6W
RL62	24366472	Res, Carbon	4. 7K	J 1/6W
RL63	24366473	Res, Carbon	47K	J 1/6W
RL64	24366152	Res, Carbon	1. 5K	J 1/6W
RL65	24366151	Res, Carbon	150	J 1/6W
RL66	24366151	Res, Carbon	150	J 1/6W
RL67	24552391	Res, Oxide Metal	390	J 1/2W

MISCELLANEOUS

LOCATION NUMBER	PART NUMBER	DESCRIPTION
PA01	70163071	Phono Jack
XA01	23153969	Crystal
XA02	23153847	Resonator, 4MHz, TCR1014
Z001	A5611190	Filter, 38. 9MHz, F1037
Z002	23107915	Filter, TCF1017
Z003	23107947	Filter, SIF, 5. 5MHz
Z004	23107740	Filter, TCF1049
Z802	23107672	DC-DC Converter, Z-802
ZA02	24000760	Resistor Block, 10k x 10
ZA03	24000766	Resistor Block, 10Kx4
ZL62	23118132	IC Protector
U002	70197934	P C Board Assy, PIF, TIMER 2, V-93T

INTEGRATED CIRCUITS

LOCATION NUMBER	PART NUMBER	DESCRIPTION		
IC002	23119143	IC	M51365SP	
ICA01	70119879	IC	TMP47C231AN4956	
ICA02	70119517	IC	M58659P	
ICA03	23119441	IC	LA7910	
ICA04	B0272490	IC	TD6305	
ICL63	70119577	IC	PST520D	
TRANSISTORS				
Q001	A6708871	Transistor	2SC388ATM	
Q003	A6534430	Transistor	2SA1048-Y	
Q004	A6332430	Transistor	2SC2458-Y	
Q007	A6534430	Transistor	2SA1048-Y	
Q008	A6002010	Transistor	RN1201	
Q009	A6317440	Transistor	2SC1815-Y	
Q010	A6002020	Transistor	RN1202	
Q011	A6342200	Transistor	2SC2878A	
QA06	A6041876	Transistor, FET	2SK117-GRFA2	
QA07	A6332430	Transistor	2SC2458-Y	
QA08	A6002060	Transistor	RN1206	
QA11	A6546320	Transistor	2SA1297GR	
QL60	A6002060	Transistor	RN1206	
QL61	A6002060	Transistor	RN1206	
QL62	A6002040	Transistor	RN1204	
DIODES				
D001	A7160570	Diode	1SS176	
DA01	70115382	Diode, Zener	MA1330-M	
DA02	A7160590	Diode	1SS177	
DL61	A7160590	Diode	1SS177	
DL62	A7160590	Diode	1SS177	
DL63	A7160590	Diode	1SS177	
DL64	A7160590	Diode	1SS177	
DL65	A7110017	Diode, Zener	05Z 5. 6-Y	
COILS				
L001	23261986	Coil, Choke	TRF9220	
L002	23261985	Coil, Choke	TRF9221	
L003	23262745	Coil, IF	TRF1132	
L004	23238912	Coil, Peaking	TRF4680AC	
L005	23237988	Coil, Peaking	TRF4829AC	
L006	23238921	Coil, Peaking	TRF4120AC	
L008	23237977	Coil, Peaking	TRF4680AC	
L009	23237976	Coil, Peaking	TRF4820AC	
L051	23262783	Coil, IF	TRF1105	
L052	23262813	Coil, IF	TRF1077D	
L053	23262748	Coil, IF	TRF1135K	
L054	23262753	Coil, IF	TRF1136K	
LA01	23238912	Coil, Peaking	TRF4680AC	
LA02	23238653	Coil, Peaking	TRF4470AI	
LL60	23238653	Coil, Peaking	TRF4470AI	
CAPACITORS				
C001	24474103	Cap, Ceramic	0. 01MF	N 50V
C002	24474103	Cap, Ceramic	0. 01MF	N 50V
C003	24474103	Cap, Ceramic	0. 01MF	N 50V
C004	24474103	Cap, Ceramic	0. 01MF	N 50V
C005	24538124	Cap, Plastic	0. 12MF	J 50V
C006	24206229	Cap, Electrolytic	2. 2MF	M 50V
C007	24206229	Cap, Electrolytic	2. 2MF	M 50V
C008	24474103	Cap, Ceramic	0. 01MF	N 50V
C009	24203470	Cap, Electrolytic	47MF	M 16V
C010	24474103	Cap, Ceramic	0. 01MF	N 50V
C011	24203100	Cap, Electrolytic	10MF	M 16V
C012	24474103	Cap, Ceramic	0. 01MF	N 50V
C013	24203220	Cap, Electrolytic	22MF	M 16V
C014	24474103	Cap, Ceramic	0. 01MF	N 50V
C015	24203470	Cap, Electrolytic	47MF	M 16V
C016	24474103	Cap, Ceramic	0. 01MF	N 50V
C017	24203100	Cap, Electrolytic	10MF	M 16V
C018	24206478	Cap, Electrolytic	0. 47MF	M 50V
C019	24206010	Cap, Electrolytic	1MF	M 50V
C020	24591473	Cap, Plastic	0. 047MF	J 50V
C021	24206010	Cap, Electrolytic	1MF	M 50V
C022	24203470	Cap, Electrolytic	47MF	M 16V
C023	24851102	Cap, Ceramic	1000PF	K 25V
C024	24851102	Cap, Ceramic	1000PF	K 25V
C028	24474103	Cap, Ceramic	0. 01MF	N 50V
C029	24473470	Cap, Ceramic	47PF	J 50V
C030	24473470	Cap, Ceramic	47PF	J 50V
C031	24538104	Cap, Plastic	0. 1MF	J 50V
C032	24473120	Cap, Ceramic	12PF	J 50V
C033	24591392	Cap, Plastic	3900PF	J 50V
C034	24203100	Cap, Electrolytic	10MF	M 16V
C035	24203470	Cap, Electrolytic	47MF	M 16V
C036	24353100	Cap, Ceramic	10PF	J 50V
C038	24538103	Cap, Plastic	0. 01MF	J 50V
C039	24357820	Cap, Ceramic	82PF	J 50V
C040	24357040	Cap, Ceramic	4PF	J 50V
C041	24357040	Cap, Ceramic	4PF	J 50V
CA01	24206100	Cap, Electrolytic	10MF	M 50V
CA02	24203100	Cap, Electrolytic	10MF	M 16V
CA03	24474103	Cap, Ceramic	0. 01MF	N 50V
CA04	24203100	Cap, Electrolytic	10MF	M 16V
CA05	24474103	Cap, Ceramic	0. 01MF	N 50V
CA06	24232223	Cap, Ceramic	0. 022MF	Z 50V
CA07	24473300	Cap, Ceramic	30PF	J 50V
CA08	24473300	Cap, Ceramic	30PF	J 50V
CA09	24202330	Cap, Electrolytic	33MF	M 10V
CA10	24474103	Cap, Ceramic	0. 01MF	N 50V
CA11	24474102	Cap, Ceramic	1000PF	K 50V
CA12	24473240	Cap, Ceramic	24PF	J 50V
CA13	24473240	Cap, Ceramic	24PF	J 50V
CA14	24474102	Cap, Ceramic	1000PF	K 50V
CA15	24474103	Cap, Ceramic	0. 01MF	N 50V
CA16	24591103	Cap, Plastic	0. 01MF	J 50V
CA17	24591104	Cap, Plastic	0. 1MF	J 50V
CA22	24203100	Cap, Electrolytic	10MF	M 16V
CL60	24793222	Cap, Electrolytic	2200MF	M 10V
CL61	24636010	Cap, Electrolytic	1MF	M 50V
CL62	24795470	Cap, Electrolytic	47MF	M 25V
CL63	24795221	Cap, Electrolytic	220MF	M 25V
RESISTORS				
R001	24366151	Res, Carbon	150	J 1/6W
R002	24366101	Res, Carbon	100	J 1/6W
R003	24366272	Res, Carbon	2. 7K	J 1/6W
R004	24366102	Res, Carbon	1K	J 1/6W
R005	24366621	Res, Carbon	620	J 1/6W
R006	24366270	Res, Carbon	27	J 1/6W
R007	24366102	Res, Carbon	1K	J 1/6W
R008	24366474	Res, Carbon	470K	J 1/6W
R010	24366164	Res, Carbon	160K	J 1/6W
R011	24366221	Res, Carbon	220	J 1/6W
R012	24366473	Res, Carbon	47K	J 1/6W
R013	24366330	Res, Carbon	33	J 1/6W
R014	24366561	Res, Carbon	560	J 1/6W
R015	24366224	Res, Carbon	220K	J 1/6W
R016	24366244	Res, Carbon	240K	J 1/6W
R017	24366224	Res, Carbon	220K	J 1/6W
R018	24366474	Res, Carbon	470K	J 1/6W
R019	24366334	Res, Carbon	330K	J 1/6W
R020	24366105	Res, Carbon	1M	J 1/6W
R021	24366471	Res, Carbon	470	J 1/6W
R022	24366204	Res, Carbon	200K	J 1/6W
R026	24366511	Res, Carbon	510	J 1/6W
R027	24366242	Res, Carbon	2. 4K	J 1/6W
R032	24366432	Res, Carbon	4. 3K	J 1/6W
R033	24366132	Res, Carbon	1. 3K	J 1/6W
R034	24366181	Res, Carbon	180	J 1/6W
R035	24366562	Res, Carbon	5. 6K	J 1/6W
R036	24366392	Res, Carbon	3. 9K	J 1/6W
R037	24366222	Res, Carbon	2. 2K	J 1/6W
R038	24366222	Res, Carbon	2. 2K	J 1/6W
R039	24366272	Res, Carbon	2. 7K	J 1/6W
R040	24366121	Res, Carbon	120	J 1/6W
R041	24366221	Res, Carbon	220	J 1/6W
R042	24366471	Res, Carbon	470	J 1/6W
R043	24366331	Res, Carbon	330	J 1/6W
R044	24366752	Res, Carbon	7. 5K	J 1/6W
R045	24366471	Res, Carbon	470	J 1/6W
R046	24366681	Res, Carbon	680	J 1/6W
R047	24366183	Res, Carbon	18K	J 1/6W
R051	24066983	Res, Variable	5K	
R060	24366331	Res, Carbon	330	J 1/6W
R063	24366680	Res, Carbon	68	J 1/6W

LOCATION NUMBER	PART NUMBER	DESCRIPTION		
RA01	24366102	Res, Carbon	1K	J 1/6W
RA02	24366102	Res, Carbon	1K	J 1/6W
RA03	24366102	Res, Carbon	1K	J 1/6W
RA04	24366102	Res, Carbon	1K	J 1/6W
RA05	24366201	Res, Carbon	200	J 1/6W
RA06	24366151	Res, Carbon	150	J 1/6W
RA07	24366562	Res, Carbon	5. 6K	J 1/6W
RA09	24366392	Res, Carbon	3. 9K	J 1/6W
RA10	24366152	Res, Carbon	1. 5K	J 1/6W
RA11	24366181	Res, Carbon	180	J 1/6W
RA12	24366393	Res, Carbon	39K	J 1/6W
RA13	24366273	Res, Carbon	27K	J 1/6W
RA14	24366334	Res, Carbon	330K	J 1/6W
RA15	24366562	Res, Carbon	5. 6K	J 1/6W
RA16	24366682	Res, Carbon	6. 8K	J 1/6W
RA17	24366682	Res, Carbon	6. 8K	J 1/6W
RA21	24366103	Res, Carbon	10K	J 1/6W
RA22	24366751	Res, Carbon	750	J 1/6W
RA24	24366102	Res, Carbon	1K	J 1/6W
RA25	24366472	Res, Carbon	4. 7K	J 1/6W
RA28	24366103	Res, Carbon	10K	J 1/6W
RA29	24366103	Res, Carbon	10K	J 1/6W
RA30	24552102	Res, Oxide Metal	1K	J 1/2W
RA31	24366221	Res, Carbon	220	J 1/6W
RA32	24366221	Res, Carbon	220	J 1/6W
RA33	24366221	Res, Carbon	220	J 1/6W
RA34	24366103	Res, Carbon	10K	J 1/6W
RA35	24366103	Res, Carbon	10K	J 1/6W
RA36	24366103	Res, Carbon	10K	J 1/6W
RA37	24366101	Res, Carbon	100	J 1/6W
RL61	24366103	Res, Carbon	10K	J 1/6W
RL62	24366472	Res, Carbon	4. 7K	J 1/6W
RL63	24366473	Res, Carbon	47K	J 1/6W
RL64	24366152	Res, Carbon	1. 5K	J 1/6W
RL65	24366151	Res, Carbon	150	J 1/6W
RL66	24366151	Res, Carbon	150	J 1/6W
RL67	24552391	Res, Oxide Metal	390	J 1/2W

MISCELLANEOUS

PA01	70163071	Phono Jack
XA01	23153969	Crystal
XA02	23153847	Resonator, 4MHz, TCR1014
Z001	A5611190	Filter, 38. 9MHz, F1037
Z002	23107915	Filter, TCF1017
Z003	23107947	Filter, SIF, 5. 5MHz
Z004	23107740	Filter, TCF1049
Z802	23107672	DC-DC Converter, Z-802
ZA02	24000760	Resistor Block, 10k x 10
ZA03	24000766	Resistor Block, 10Kx4
ZL62	23118132	IC Protector
UX01	70197817	P C Board Assy, TIMER 1, V-93G
UX01	70197935	P C Board Assy, TIMER 1, V-93T
UX01	70197881	P C Board Assy, TIMER 1, V-93W

INTEGRATED CIRCUITS

ICR01	23119566	IC	UPC1474HA
ICX01	70119878	IC	TMP47C870N4844Z
ICX03	70119413	IC	PST520C

TRANSISTORS

QX02	A6332430	Transistor	2SC2458-Y

DIODES

DR01	23115800	Diode, Photo	PH-302
DX04	A7160590	Diode	1SS177
DX06	A7160590	Diode	1SS177
DX07	A7160590	Diode	1SS177
DX08	A7160590	Diode	1SS177
DX09	A7160590	Diode	1SS177
DX10	A7160590	Diode	1SS177
DX11	A7160590	Diode	1SS177

COILS

LR01	23238722	Coil, Peaking	TRF4822AI

CAPACITORS

CR01	24202330	Cap, Electrolytic	33MF	M 10V
CR02	24203100	Cap, Electrolytic	10MF	M 16V
CR03	24203100	Cap, Electrolytic	10MF	M 16V
CR04	24593222	Cap, Plastic	2200PF	J 50V

LOCATION NUMBER	PART NUMBER	DESCRIPTION		
CR05	24538473	Cap, Plastic	0. 047MF	J 50V
CR06	24501222	Cap, Plastic	2200PF	J 50V
CR07	24202101	Cap, Electrolytic	100MF	M 10V
CX01	24202101	Cap, Electrolytic	100MF	M 10V
CX02	24473330	Cap, Ceramic	33PF	J 50V
CX03	24473330	Cap, Ceramic	33PF	J 50V
CX04	24474103	Cap, Ceramic	0. 01MF	N 50V
CX05	24474103	Cap, Ceramic	0. 01MF	N 50V
CX06	24474103	Cap, Ceramic	0. 01MF	N 50V

RESISTORS

RR01	24366222	Res, Carbon	2. 2K	J 1/6W
RR02	24366100	Res, Carbon	10	J 1/6W
RR03	24366103	Res, Carbon	10K	J 1/6W
RR04	24366223	Res, Carbon	22K	J 1/6W
RX01	24366472	Res, Carbon	4. 7K	J 1/6W
RX02	24366223	Res, Carbon	22K	J 1/6W
RX03	24366222	Res, Carbon	2. 2K	J 1/6W
RX05	24366221	Res, Carbon	220	J 1/6W
RX06	24366221	Res, Carbon	220	J 1/6W
RX07	24366221	Res, Carbon	220	J 1/6W
RX08	24366221	Res, Carbon	220	J 1/6W
RX09	24366223	Res, Carbon	22K	J 1/6W
RX10	24366223	Res, Carbon	22K	J 1/6W
RX11	24366223	Res, Carbon	22K	J 1/6W
RX12	24366223	Res, Carbon	22K	J 1/6W
RX13	24366223	Res, Carbon	22K	J 1/6W
RX14	24366223	Res, Carbon	22K	J 1/6W
RX15	24366123	Res, Carbon	12K	J 1/6W
RX16	24366123	Res, Carbon	12K	J 1/6W
RX17	24366123	Res, Carbon	12K	J 1/6W
RX18	24366123	Res, Carbon	12K	J 1/6W
RX19	24366123	Res, Carbon	12K	J 1/6W
* RX20	24366102	Res, Carbon	1K	J 1/6W
* RX21	24366102	Res, Carbon	1K	J 1/6W
* RX22	24366102	Res, Carbon	1K	J 1/6W
* RX23	24366102	Res, Carbon	1K	J 1/6W
* RX24	24366102	Res, Carbon	1K	J 1/6W
RX25	24366103	Res, Carbon	10K	J 1/6W
* RX27	24366102	Res, Carbon	1K	J 1/6W
RX28	24366103	Res, Carbon	10K	J 1/6W
RX29	24366271	Res, Carbon	270	J 1/6W
* RX31	24366103	Res, Carbon	10K	J 1/6W
* RX32	24366102	Res, Carbon	1K	J 1/6W
RX33	24366102	Res, Carbon	1K	J 1/6W
RX34	24366473	Res, Carbon	47K	J 1/6W

MISCELLANEOUS

GX01	70113108	FIP, 14GM6	
GX01A	70843250	FIP Holder (L)	
GX01B	70843251	FIP Holder (R)	
GX01C	70867608	Timer Filter Cover	
S201	23145532	Slide Switch, 2C3P	
SL02	23145394	Push Swltch, 1C1P	
SX01	23145394	Push Swltch, 1C1P	
SX02	23145394	Push Swltch, 1C1P	
SX03	23145394	Push Swltch, 1C1P	
SX04	23145394	Push Swltch, 1C1P	
SX05	23145394	Push Swltch, 1C1P	
SX06	23145394	Push Swltch, 1C1P	
SX07	23145394	Push Swltch, 1C1P	
SX08	23145394	Push Swltch, 1C1P	
SX09	23145394	Push Swltch, 1C1P	
SX10	23145394	Push Swltch, 1C1P	
SX11	23145394	Push Swltch, 1C1P	
SX12	23145394	Push Swltch, 1C1P	
SX13	23145394	Push Swltch, 1C1P	
SX16	23145394	Push Swltch, 1C1P	
SX17	23145394	Push Swltch, 1C1P	
SX18	23145394	Push Swltch, 1C1P	
SX19	23145394	Push Swltch, 1C1P	
SX21	23145394	Push Swltch, 1C1P	
* SX22	23145394	Push Swltch, 1C1P	
TR01	23232963	Coil, Variable	TRF3055
XX01	23153847	Resonator, 4MHz, TCR1014	
U101	70197688	P C Board Assy, PREAMP	

LOCATION NUMBER	PART NUMBER	DESCRIPTION		

INTEGRATED CIRCUITS

IC101	70119856	IC	AN3313	

TRANSISTORS

Q102	A6332430	Transistor	2SC2458-Y	
Q103	A6332430	Transistor	2SC2458-Y	
Q104	A6332430	Transistor	2SC2458-Y	
Q105	A6332430	Transistor	2SC2458-Y	
Q106	A6332430	Transistor	2SC2458-Y	

COILS

L101	23237837	Coil,Peaking	TRF4101AF	
L102	23238705	Coil,Peaking	TRF4560AJ	
L103	23239835	Coil,Peaking	TRF4109AJ	
L104	23237857	Coil,Peaking	TRF4150AF	

CAPACITORS

C101	24630953	Cap,Electrolytic	47MF	M 6.3V
C102	24474103	Cap,Ceramic	0. 01MF	N 50V
C103	24206010	Cap,Electrolytic	1MF	M 50V
C104	24206010	Cap,Electrolytic	1MF	M 50V
C105	24206010	Cap,Electrolytic	1MF	M 50V
C106	24206010	Cap,Electrolytic	1MF	M 50V
C107	24474103	Cap,Ceramic	0. 01MF	N 50V
C108	24474103	Cap,Ceramic	0. 01MF	N 50V
C109	24474103	Cap,Ceramic	0. 01MF	N 50V
C110	24474103	Cap,Ceramic	0. 01MF	N 50V
C111	24630953	Cap,Electrolytic	47MF	M 6.3V
C112	24474103	Cap,Ceramic	0. 01MF	N 50V
C113	24630933	Cap,Electrolytic	1MF	M 50V
C114	24473270	Cap,Ceramic	27PF	J 50V
C115	24630934	Cap,Electrolytic	0.47MF	M 50V

RESISTORS

R101	24366821	Res,Carbon	820	J 1/6W
R102	24366821	Res,Carbon	820	J 1/6W
R103	24366682	Res,Carbon	6. 8K	J 1/6W
R104	24366102	Res,Carbon	1K	J 1/6W
R105	24366682	Res,Carbon	6. 8K	J 1/6W
R106	24366102	Res,Carbon	1K	J 1/6W
R107	24366472	Res,Carbon	4. 7K	J 1/6W
R108	24366102	Res,Carbon	1K	J 1/6W
R109	24366152	Res,Carbon	1. 5K	J 1/6W
R110	24366101	Res,Carbon	100	J 1/6W
R111	24366102	Res,Carbon	1K	J 1/6W
R112	24366102	Res,Carbon	1K	J 1/6W
R113	24366681	Res,Carbon	680	J 1/6W
R114	24366102	Res,Carbon	1K	J 1/6W
R115	24366682	Res,Carbon	6. 8K	J 1/6W
R116	24366102	Res,Carbon	1K	J 1/6W

U202	70197813	P C Board Assy,MAIN		

INTEGRATED CIRCUITS

IC201	70119859	IC	BA7258AS	
IC202	B0589590	IC	TL8709P	
IC501	B0272628	IC	TD6361N-D5	
IC502	B0379180	IC	TA8618S	
IC503	B0347530	IC	TA75358CP	
IC504	B0470532	IC	TC4053BP	
IC601	70119860	IC	TMP47C460AN9255	
IC602	B0320635	IC	TA7288P	
IC603	B0320440	IC	TA7267P	
IC604	B0347230	IC	TA75339P	

TRANSISTORS

Q161	A6332430	Transistor	2SC2458-Y	
Q162	A6332430	Transistor	2SC2458-Y	
Q163	A6002020	Transistor	RN1202	
Q164	A6534430	Transistor	2SA1048-Y	
Q165	A6332430	Transistor	2SC2458-Y	
Q166	A6332430	Transistor	2SC2458-Y	
Q167	A6332430	Transistor	2SC2458-Y	
Q168	A6534430	Transistor	2SA1048-Y	
Q203	A6002040	Transistor	RN1204	
Q204	A6012010	Transistor	RN2201	
Q205	A6534430	Transistor	2SA1048-Y	
Q206	A6002030	Transistor	RN1203	
Q207	A6332430	Transistor	2SC2458-Y	
Q208	A6002040	Transistor	RN1204	
Q210	A6002040	Transistor	RN1204	

LOCATION NUMBER	PART NUMBER	DESCRIPTION	
Q211	A6012020	Transistor	RN2202
Q212	A6332430	Transistor	2SC2458-Y
Q213	A6332430	Transistor	2SC2458-Y
Q214	A6332430	Transistor	2SC2458-Y
Q215	A6012040	Transistor	RN2204
Q216	A6012040	Transistor	RN2204
Q218	A6002010	Transistor	RN1201
Q219	A6012040	Transistor	RN2204
Q220	A6002040	Transistor	RN1204
Q221	A6534430	Transistor	2SA1048-Y
Q222	A6012040	Transistor	RN2204
Q223	A6002040	Transistor	RN1204
Q224	A6534430	Transistor	2SA1048-Y
Q508	A6868350	Transistor	2SD1413
Q509	A6868350	Transistor	2SD1413
Q510	A6002060	Transistor	RN1206
Q511	A6002040	Transistor	RN1204
Q512	A6012040	Transistor	RN2204
Q513	A6012040	Transistor	RN2204
Q514	A6002040	Transistor	RN1204
Q515	A6012040	Transistor	RN2204
Q516	A6002040	Transistor	RN1204
Q517	A6002040	Transistor	RN1204
Q518	A6002020	Transistor	RN1202
Q519	A6002060	Transistor	RN1206
Q521	A6533240	Transistor	2SA966-Y
Q528	A6012040	Transistor	RN2204
Q530	A6002060	Transistor	RN1206
Q611	A6868450	Transistor	2SD1415
Q612	A6325540	Transistor	SC2236-Y
Q615	A6534430	Transistor	2SA1048-Y
Q616	A6325540	Transistor	SC2236-Y
Q617	A6325540	Transistor	SC2236-Y
Q618	A6002060	Transistor	RN1206
Q619	A6002010	Transistor	RN1201
Q620	A6325540	Transistor	SC2236-Y
Q621	A6002060	Transistor	RN1206
Q622	A6002030	Transistor	RN1203
Q623	A6002030	Transistor	RN1203
Q624	A6534430	Transistor	2SA1048-Y
Q625	A6639320	Transistor	2SB1015-Y
Q626	A6332430	Transistor	2SC2458-Y
Q627	A6002010	Transistor	RN1201
Q628	A6002030	Transistor	RN1203
Q629	A6002010	Transistor	RN1201
Q630	A6002020	Transistor	RN1202
Q631	A6002020	Transistor	RN1202
Q632	A6012020	Transistor	RN2202
Q633	A6012060	Transistor	RN2206
Q635	A6332430	Transistor	2SC2458-Y
Q636	A6332430	Transistor	2SC2458-Y
Q637	A6002040	Transistor	RN1204
Q640	A6332430	Transistor	2SC2458-Y
Q641	A6534430	Transistor	2SA1048-Y

DIODES

D201	A7110160	Diode,Zener	05Z 7. 5-Y
D202	A7160570	Diode	1SS176
D203	A7160570	Diode	1SS176
D204	A7152800	Diode	1SS227
D501	A7152800	Diode	1SS227
D502	A7152800	Diode	1SS227
D503	A7160570	Diode	1SS176
D504	A7160570	Diode	1SS176
D505	A7160570	Diode	1SS176
D506	A7160570	Diode	1SS176
D507	A7160570	Diode	1SS176
D511	A7160570	Diode	1SS176
D512	A7110040	Diode,Zener	05Z5.1X
D513	A7160570	Diode	1SS176
D514	A7160570	Diode	1SS176
D515	A7160570	Diode	1SS176
D516	A7160570	Diode	1SS176
D517	A7160570	Diode	1SS176
D530	A7160570	Diode	1SS176
D605	A7160570	Diode	1SS176

LOCATION NUMBER	PART NUMBER	DESCRIPTION		
D606	A7160570	Diode	1SS176	
D607	A7160570	Diode	1SS176	
D609	A7160570	Diode	1SS176	
D611	A7160570	Diode	1SS176	
D612	A7110462	Diode, Zener	05Z 13-Y	
COILS				
L011	23238714	Coil, Peaking	TRF4100AJ	
L161	23237980	Coil, Peaking	TRF4390AC	
L162	23237969	Coil, Peaking	TRF4331AC	
L163	23237980	Coil, Peaking	TRF4390AC	
L164	23237985	Coil, Peaking	TRF4150AC	
L165	23238926	Coil, Peaking	TRF4479AC	
L166	23237970	Coil, Peaking	TRF4271AC	
L167	23238705	Coil, Peaking	TRF4560AJ	
L168	23237971	Coil, Peaking	TRF4221AC	
L201	23237978	Coil, Peaking	TRF4560AC	
L202	23237981	Coil, Peaking	TRF4330AC	
L205	23237978	Coil, Peaking	TRF4560AC	
L206	23237977	Coil, Peaking	TRF4680AC	
L207	23238708	Coil, Peaking	TRF4330AJ	
L208	70131039	Filter, ZBF503D-00		
L601	23238926	Coil, Peaking	TRF4479AC	
CAPACITORS				
C161	24632470	Cap, Electrolytic	47MF	M 10V
C162	24474103	Cap, Ceramic	0. 01MF	N 50V
C163	24473569	Cap, Ceramic	5. 6PF	K 50V
C164	24473150	Cap, Ceramic	15PF	J 50V
C165	24436621	Cap, Ceramic	620PF	J 50V
C166	24473560	Cap, Ceramic	56PF	J 50V
C167	24206010	Cap, Electrolytic	1MF	M 50V
C168	24474103	Cap, Ceramic	0. 01MF	N 50V
C169	24474103	Cap, Ceramic	0. 01MF	N 50V
C170	24474103	Cap, Ceramic	0. 01MF	N 50V
C171	24474103	Cap, Ceramic	0. 01MF	N 50V
C172	24473689	Cap, Ceramic	6. 8PF	K 50V
C173	24474103	Cap, Ceramic	0. 01MF	N 50V
C174	24436121	Cap, Ceramic	120PF	J 50V
C175	24474121	Cap, Ceramic	120PF	K 50V
C176	24474103	Cap, Ceramic	0. 01MF	N 50V
C177	24632470	Cap, Electrolytic	47MF	M 10V
C179	24436221	Cap, Ceramic	220PF	J 50V
C180	24473100	Cap, Ceramic	10PF	J 50V
C181	24436471	Cap, Ceramic	470PF	J 50V
C201	24203470	Cap, Electrolytic	47MF	M 16V
C202	24474103	Cap, Ceramic	0. 01MF	N 50V
C203	24474103	Cap, Ceramic	0. 01MF	N 50V
C204	24203470	Cap, Electrolytic	47MF	M 16V
C205	24206010	Cap, Electrolytic	1MF	M 50V
C206	24205479	Cap, Electrolytic	4. 7MF	M 35V
C207	24473330	Cap, Ceramic	33PF	J 50V
C208	24473399	Cap, Ceramic	3. 9PF	K 50V
C209	24473560	Cap, Ceramic	56PF	J 50V
C210	24474103	Cap, Ceramic	0. 01MF	N 50V
C211	24474103	Cap, Ceramic	0. 01MF	N 50V
C212	24085973	Cap, Electrolytic	0. 47MF	M 50V
C213	24591332	Cap, Plastic	3300PF	J 50V
C214	24851153	Cap, Ceramic	0. 015MF	K 25V
C215	24474103	Cap, Ceramic	0. 01MF	N 50V
C216	24474103	Cap, Ceramic	0. 01MF	N 50V
C217	24473560	Cap, Ceramic	56PF	J 50V
C218	24473399	Cap, Ceramic	3. 9PF	K 50V
C219	24473270	Cap, Ceramic	27PF	J 50V
C220	24633100	Cap, Electrolytic	10MF	M 16V
C221	24473620	Cap, Ceramic	62PF	J 50V
C222	24436391	Cap, Ceramic	390PF	J 50V
C223	24473470	Cap, Ceramic	47PF	J 50V
C224	24436101	Cap, Ceramic	100PF	J 50V
C225	24201220	Cap, Electrolytic	22MF	M 6. 3V
C226	24474103	Cap, Ceramic	0. 01MF	N 50V
C227	24201220	Cap, Electrolytic	22MF	M 6. 3V
C228	24474103	Cap, Ceramic	0. 01MF	N 50V
C229	24793221	Cap, Electrolytic	220MF	M 10V
C230	24205479	Cap, Electrolytic	4. 7MF	M 35V
C231	24205479	Cap, Electrolytic	4. 7MF	M 35V
C232	24203100	Cap, Electrolytic	10MF	M 16V
C233	24206339	Cap, Electrolytic	3. 3MF	M 50V
C234	24473470	Cap, Ceramic	47PF	J 50V
C235	24632470	Cap, Electrolytic	47MF	M 10V
C236	24206010	Cap, Electrolytic	1MF	M 50V
C237	24436471	Cap, Ceramic	470PF	J 50V
C238	24473330	Cap, Ceramic	33PF	J 50V
C239	24473680	Cap, Ceramic	68PF	J 50V
C240	24474103	Cap, Ceramic	0. 01MF	N 50V
C241	24474103	Cap, Ceramic	0. 01MF	N 50V
C242	24591472	Cap, Plastic	4700PF	J 50V
C243	24474102	Cap, Ceramic	1000PF	K 50V
C244	24591392	Cap, Plastic	3900PF	J 50V
C245	24851683	Cap, Ceramic	0. 068MF	K 25V
C246	24474103	Cap, Ceramic	0. 01MF	N 50V
C249	24474103	Cap, Ceramic	0. 01MF	N 50V
C261	24474103	Cap, Ceramic	0. 01MF	N 50V
C501	24794470	Cap, Electrolytic	47MF	M 16V
C502	24591122	Cap, Plastic	1200PF	J 50V
C503	24591183	Cap, Plastic	0. 018MF	J 50V
C504	24591183	Cap, Plastic	0. 018MF	J 50V
C505	24591273	Cap, Plastic	0. 027MF	J 50V
C506	24474102	Cap, Ceramic	1000PF	K 50V
C507	24203470	Cap, Electrolytic	47MF	M 16V
C508	24203100	Cap, Electrolytic	10MF	M 16V
C509	24203100	Cap, Electrolytic	10MF	M 16V
C510	24474102	Cap, Ceramic	1000PF	K 50V
C511	24474681	Cap, Ceramic	680PF	K 50V
C512	24206229	Cap, Electrolytic	2. 2MF	M 50V
C513	24474561	Cap, Ceramic	560PF	K 50V
C514	24203470	Cap, Electrolytic	47MF	M 16V
C515	24474101	Cap, Ceramic	100PF	K 50V
C516	24203470	Cap, Electrolytic	47MF	M 16V
C517	24203100	Cap, Electrolytic	10MF	M 16V
C518	24538823	Cap, Plastic	0. 082MF	J 50V
C519	24474103	Cap, Ceramic	0. 01MF	N 50V
C520	24203220	Cap, Electrolytic	22MF	M 16V
C521	24474222	Cap, Ceramic	2200PF	N 16V
C522	24474103	Cap, Ceramic	0. 01MF	N 50V
C523	24794470	Cap, Electrolytic	47MF	M 16V
C524	24232103	Cap, Ceramic	0. 01MF	Z 50V
C525	24538224	Cap, Plastic	0. 22MF	J 50V
C526	24206229	Cap, Electrolytic	2. 2MF	M 50V
C527	24538224	Cap, Plastic	0. 22MF	J 50V
C528	24474681	Cap, Ceramic	680PF	K 50V
C529	24591103	Cap, Plastic	0. 01MF	J 50V
C530	24203100	Cap, Electrolytic	10MF	M 16V
C531	24474102	Cap, Ceramic	1000PF	K 50V
C537	24474102	Cap, Ceramic	1000PF	K 50V
C538	24474103	Cap, Ceramic	0. 01MF	N 50V
C539	24474102	Cap, Ceramic	1000PF	K 50V
C540	24538104	Cap, Plastic	0. 1MF	J 50V
C541	24474103	Cap, Ceramic	0. 01MF	N 50V
C542	24474103	Cap, Ceramic	0. 01MF	N 50V
C550	24474102	Cap, Ceramic	1000PF	K 50V
C601	24794470	Cap, Electrolytic	47MF	M 16V
C602	24474103	Cap, Ceramic	0. 01MF	N 50V
C604	24473330	Cap, Ceramic	33PF	J 50V
C605	24473330	Cap, Ceramic	33PF	J 50V
C609	24795470	Cap, Electrolytic	47MF	M 25V
C610	24795470	Cap, Electrolytic	47MF	M 25V
C611	24205100	Cap, Electrolytic	10MF	M 35V
C612	24474103	Cap, Ceramic	0. 01MF	N 50V
C613	24474103	Cap, Ceramic	0. 01MF	N 50V
C614	24474103	Cap, Ceramic	0. 01MF	N 50V
C615	24232223	Cap, Ceramic	0. 022MF	Z 50V
C616	24232223	Cap, Ceramic	0. 022MF	Z 50V
C620	24232223	Cap, Ceramic	0. 022MF	Z 50V
C621	24232223	Cap, Ceramic	0. 022MF	Z 50V
C622	24232223	Cap, Ceramic	0. 022MF	Z 50V
C626	24794470	Cap, Electrolytic	47MF	M 16V
C627	24794470	Cap, Electrolytic	47MF	M 16V
C629	24795470	Cap, Electrolytic	47MF	M 25V
C631	24203220	Cap, Electrolytic	22MF	M 16V
C632	24203220	Cap, Electrolytic	22MF	M 16V
C633	24203220	Cap, Electrolytic	22MF	M 16V

LOCATION NUMBER	PART NUMBER	DESCRIPTION		
C634	24203220	Cap,Electrolytic	22MF	M 16V
C636	24203100	Cap,Electrolytic	10MF	M 16V
C637	24474151	Cap,Ceramic	150PF	K 50V
C722	24632220	Cap,Electrolytic	22MF	M 10V

RESISTORS

LOCATION NUMBER	PART NUMBER	DESCRIPTION		
R161	24366102	Res,Carbon	1K	J 1/6W
R162	24367472	Res,Carbon	4. 7K	G 1/6W
R163	24367122	Res,Carbon	1. 2K	G 1/6W
R164	24367122	Res,Carbon	1. 2K	G 1/6W
R165	24366151	Res,Carbon	150	J 1/6W
R166	24366271	Res,Carbon	270	J 1/6W
R167	24366391	Res,Carbon	390	J 1/6W
R168	24366152	Res,Carbon	1. 5K	J 1/6W
R169	24367220	Res,Carbon	22	G 1/6W
R170	24367220	Res,Carbon	22	G 1/6W
R171	24366102	Res,Carbon	1K	J 1/6W
R172	24366332	Res,Carbon	3. 3K	J 1/6W
R173	24366332	Res,Carbon	3. 3K	J 1/6W
R174	24366102	Res,Carbon	1K	J 1/6W
R175	24366479	Res,Carbon	4.7	J 1/6W
R176	24366511	Res,Carbon	510	J 1/6W
R177	24366820	Res,Carbon	82	J 1/6W
R178	24366202	Res,Carbon	2K	J 1/6W
R179	24366751	Res,Carbon	750	J 1/6W
R180	24367333	Res,Carbon	33K	G 1/6W
R181	24366472	Res,Carbon	4. 7K	J 1/6W
R182	24367153	Res,Carbon	15K	G 1/6W
R183	24366272	Res,Carbon	2. 7K	J 1/6W
R184	24366102	Res,Carbon	1K	J 1/6W
R185	24366102	Res,Carbon	1K	J 1/6W
R186	24366182	Res,Carbon	1. 8K	J 1/6W
R187	24366102	Res,Carbon	1K	J 1/6W
R188	24366221	Res,Carbon	220	J 1/6W
R201	24366620	Res,Carbon	62	J 1/6W
R202	24366821	Res,Carbon	820	J 1/6W
R203	24000952	Res,Thermistor	3K	
R204	24366102	Res,Carbon	1K	J 1/6W
R205	24366151	Res,Carbon	150	J 1/6W
R206	24366272	Res,Carbon	2. 7K	J 1/6W
R207	24366684	Res,Carbon	680K	J 1/6W
R208	24366223	Res,Carbon	22K	J 1/6W
R209	24366102	Res,Carbon	1K	J 1/6W
R210	24366133	Res,Carbon	13K	J 1/6W
R211	24366433	Res,Carbon	43K	J 1/6W
R212	24366102	Res,Carbon	1K	J 1/6W
R213	24366272	Res,Carbon	2. 7K	J 1/6W
R214	24366821	Res,Carbon	820	J 1/6W
R215	24366392	Res,Carbon	3. 9K	J 1/6W
R216	24366471	Res,Carbon	470	J 1/6W
R217	24366273	Res,Carbon	27K	J 1/6W
R219	24366393	Res,Carbon	39K	J 1/6W
R220	24366183	Res,Carbon	18K	J 1/6W
R221	24366153	Res,Carbon	15K	J 1/6W
R222	24366222	Res,Carbon	2. 2K	J 1/6W
R223	24366182	Res,Carbon	1. 8K	J 1/6W
R224	24366102	Res,Carbon	1K	J 1/6W
R225	24366470	Res,Carbon	47	J 1/6W
R226	24366470	Res,Carbon	47	J 1/6W
R227	24366221	Res,Carbon	220	J 1/6W
R229	24366563	Res,Carbon	56K	J 1/6W
R230	24366183	Res,Carbon	18K	J 1/6W
R231	24366102	Res,Carbon	1K	J 1/6W
R232	24366392	Res,Carbon	3. 9K	J 1/6W
R233	24366153	Res,Carbon	15K	J 1/6W
R234	24366392	Res,Carbon	3. 9K	J 1/6W
R235	24366822	Res,Carbon	8. 2K	J 1/6W
R237	24366474	Res,Carbon	470K	J 1/6W
R238	24366104	Res,Carbon	100K	J 1/6W
R241	24366272	Res,Carbon	2. 7K	J 1/6W
R242	24366563	Res,Carbon	56K	J 1/6W
R243	24366472	Res,Carbon	4. 7K	J 1/6W
R244	24366823	Res,Carbon	82K	J 1/6W
R245	24366472	Res,Carbon	4. 7K	J 1/6W
R246	24366393	Res,Carbon	39K	J 1/6W
R247	24366333	Res,Carbon	33K	J 1/6W
R248	24366103	Res,Carbon	10K	J 1/6W
R249	24366103	Res,Carbon	10K	J 1/6W
R251	24066952	Res,Variable	10K	
R252	24066952	Res,Variable	10K	
R253	24066952	Res,Variable	10K	
R254	24066949	Res,Variable	100K	
R255	24066954	Res,Variable	2K	
R256	24066951	Res,Variable	20K	
R257	24066955	Res,Variable	1K	
R258	24066954	Res,Variable	2K	
R259	24066953	Res,Variable	100K	
R261	24366563	Res,Carbon	56K	J 1/6W
R262	24366103	Res,Carbon	10K	J 1/6W
R263	24366472	Res,Carbon	4. 7K	J 1/6W
R264	24366392	Res,Carbon	3. 9K	J 1/6W
R265	24366392	Res,Carbon	3. 9K	J 1/6W
R267	24366473	Res,Carbon	47K	J 1/6W
R269	24366683	Res,Carbon	68K	J 1/6W
R270	24366473	Res,Carbon	47K	J 1/6W
R271	24366564	Res,Carbon	560K	J 1/6W
R272	24366102	Res,Carbon	1K	J 1/6W
R273	24366101	Res,Carbon	100	J 1/6W
R274	24366222	Res,Carbon	2. 2K	J 1/6W
R501	24552820	Res,Oxide Metal	82	J 1/2W
R502	24366912	Res,Carbon	9. 1K	J 1/6W
R503	24366103	Res,Carbon	10K	J 1/6W
R504	24366472	Res,Carbon	4. 7K	J 1/6W
R505	24366472	Res,Carbon	4. 7K	J 1/6W
R506	24366512	Res,Carbon	5. 1K	J 1/6W
R507	24366472	Res,Carbon	4. 7K	J 1/6W
R508	24366472	Res,Carbon	4. 7K	J 1/6W
R509	24366472	Res,Carbon	4. 7K	J 1/6W
R510	24366472	Res,Carbon	4. 7K	J 1/6W
R511	24366272	Res,Carbon	2. 7K	J 1/6W
R512	24941275	Res,Composition	2. 7M	J 1/4W
R513	24366752	Res,Carbon	7. 5K	J 1/6W
R514	24366683	Res,Carbon	68K	J 1/6W
R515	24366823	Res,Carbon	82K	J 1/6W
R516	24366683	Res,Carbon	68K	J 1/6W
R517	24366334	Res,Carbon	330K	J 1/6W
R518	24366334	Res,Carbon	330K	J 1/6W
R519	24366334	Res,Carbon	330K	J 1/6W
R520	24366334	Res,Carbon	330K	J 1/6W
R521	24366823	Res,Carbon	82K	J 1/6W
R522	24366184	Res,Carbon	180K	J 1/6W
R523	24366104	Res,Carbon	100K	J 1/6W
R524	24366102	Res,Carbon	1K	J 1/6W
R525	24366105	Res,Carbon	1M	J 1/6W
R526	24366683	Res,Carbon	68K	J 1/6W
R527	24366332	Res,Carbon	3. 3K	J 1/6W
R528	24366823	Res,Carbon	82K	J 1/6W
R529	24366114	Res,Carbon	110K	J 1/6W
R530	24366224	Res,Carbon	220K	J 1/6W
R531	24366223	Res,Carbon	22K	J 1/6W
R532	24366223	Res,Carbon	22K	J 1/6W
R533	24366472	Res,Carbon	4. 7K	J 1/6W
R534	24366222	Res,Carbon	2. 2K	J 1/6W
R536	24366222	Res,Carbon	2. 2K	J 1/6W
R537	24366223	Res,Carbon	22K	J 1/6W
R538	24366913	Res,Carbon	91K	J 1/6W
R539	24366472	Res,Carbon	4. 7K	J 1/6W
R540	24366221	Res,Carbon	220	J 1/6W
R542	24366122	Res,Carbon	1. 2K	J 1/6W
R543	24366114	Res,Carbon	110K	J 1/6W
R544	24366102	Res,Carbon	1K	J 1/6W
R545	24366105	Res,Carbon	1M	J 1/6W
R546	24366102	Res,Carbon	1K	J 1/6W
R547	24366361	Res,Carbon	360	J 1/6W
R548	24366105	Res,Carbon	1M	J 1/6W
R549	24366472	Res,Carbon	4. 7K	J 1/6W
R551	24066829	Res,Variable	200K	
R552	24066829	Res,Variable	200K	
R553	24066948	Res,Variable	200K	
R555	24066946	Res,Variable	1M	
R558	24066911	Res,Variable	50K	

LOCATION NUMBER	PART NUMBER	DESCRIPTION		
R560	24366470	Res, Carbon	47	J 1/6W
R561	24366472	Res, Carbon	4. 7K	J 1/6W
R562	24366103	Res, Carbon	10K	J 1/6W
R563	24366754	Res, Carbon	750K	J 1/6W
R581	24366204	Res, Carbon	200K	J 1/6W
R582	24366472	Res, Carbon	4. 7K	J 1/6W
R583	24366472	Res, Carbon	4. 7K	J 1/6W
R584	24366472	Res, Carbon	4. 7K	J 1/6W
R585	24366102	Res, Carbon	1K	J 1/6W
R586	24366102	Res, Carbon	1K	J 1/6W
R587	24366472	Res, Carbon	4. 7K	J 1/6W
R588	24366334	Res, Carbon	330K	J 1/6W
R589	24366472	Res, Carbon	4. 7K	J 1/6W
R590	24366102	Res, Carbon	1K	J 1/6W
R595	24366221	Res, Carbon	220	J 1/6W
R596	24366221	Res, Carbon	220	J 1/6W
R597	24366471	Res, Carbon	470	J 1/6W
R598	24366472	Res, Carbon	4. 7K	J 1/6W
R599	24366472	Res, Carbon	4. 7K	J 1/6W
R601	24366101	Res, Carbon	100	J 1/6W
R602	24366102	Res, Carbon	1K	J 1/6W
R603	24366272	Res, Carbon	2. 7K	J 1/6W
R604	24366682	Res, Carbon	6. 8K	J 1/6W
R605	24366154	Res, Carbon	150K	J 1/6W
R606	24367682	Res, Carbon	6. 8K	G 1/6W
R607	24367472	Res, Carbon	4. 7K	G 1/6W
R608	24366681	Res, Carbon	680	J 1/6W
R609	24366681	Res, Carbon	680	J 1/6W
R610	24366472	Res, Carbon	4. 7K	J 1/6W
R611	24366103	Res, Carbon	10K	J 1/6W
R613	24366103	Res, Carbon	10K	J 1/6W
R614	24366103	Res, Carbon	10K	J 1/6W
R615	24366103	Res, Carbon	10K	J 1/6W
R616	24366103	Res, Carbon	10K	J 1/6W
R617	24366103	Res, Carbon	10K	J 1/6W
R618	24366103	Res, Carbon	10K	J 1/6W
R619	24366102	Res, Carbon	1K	J 1/6W
R620	24366103	Res, Carbon	10K	J 1/6W
R621	24366103	Res, Carbon	10K	J 1/6W
R622	24366103	Res, Carbon	10K	J 1/6W
R623	24366103	Res, Carbon	10K	J 1/6W
R624	24366472	Res, Carbon	4. 7K	J 1/6W
R625	24366472	Res, Carbon	4. 7K	J 1/6W
R626	24366472	Res, Carbon	4. 7K	J 1/6W
R627	24366124	Res, Carbon	120K	J 1/6W
R628	24366124	Res, Carbon	120K	J 1/6W
R629	24366473	Res, Carbon	47K	J 1/6W
R630	24366151	Res, Carbon	150	J 1/6W
R631	24366183	Res, Carbon	18K	J 1/6W
R632	24366183	Res, Carbon	18K	J 1/6W
R633	24366102	Res, Carbon	1K	J 1/6W
R634	24366332	Res, Carbon	3. 3K	J 1/6W
R635	24366511	Res, Carbon	510	J 1/6W
R636	24366102	Res, Carbon	1K	J 1/6W
R637	24366222	Res, Carbon	2. 2K	J 1/6W
R638	24366561	Res, Carbon	560	J 1/6W
R639	24366102	Res, Carbon	1K	J 1/6W
R640	24366332	Res, Carbon	3. 3K	J 1/6W
R641	24366332	Res, Carbon	3. 3K	J 1/6W
R642	24366561	Res, Carbon	560	J 1/6W
R643	24982399	Res, Metal	3. 9	J 1/2W
R644	24366152	Res, Carbon	1. 5K	J 1/6W
R645	24367272	Res, Carbon	2.7K	G 1/6W
R646	24367302	Res, Carbon	3K	G 1/6W
R647	24367331	Res, Carbon	330	G 1/6W
R648	24367162	Res, Carbon	1. 6K	G 1/6W
R651	24066952	Res, Variable	10K	
R652	24066954	Res, Variable	2K	
R660	24366102	Res, Carbon	1K	J 1/6W
R661	24366102	Res, Carbon	1K	J 1/6W
R662	24366102	Res, Carbon	1K	J 1/6W
R663	24366103	Res, Carbon	10K	J 1/6W
R664	24366103	Res, Carbon	10K	J 1/6W
R665	24366334	Res, Carbon	330K	J 1/6W
R666	24366334	Res, Carbon	330K	J 1/6W

LOCATION NUMBER	PART NUMBER	DESCRIPTION		
R667	24366332	Res, Carbon	3. 3K	J 1/6W
R668	24366432	Res, Carbon	4. 3K	J 1/6W
R669	24366472	Res, Carbon	4. 7K	J 1/6W
R670	24366561	Res, Carbon	560	J 1/6W
R671	24366561	Res, Carbon	560	J 1/6W
R672	24366221	Res, Carbon	220	J 1/6W
R673	24366472	Res, Carbon	4. 7K	J 1/6W
R674	24366103	Res, Carbon	10K	J 1/6W
R676	24366102	Res, Carbon	1K	J 1/6W
R677	24366103	Res, Carbon	10K	J 1/6W
R678	24366473	Res, Carbon	47K	J 1/6W
R680	24366472	Res, Carbon	4. 7K	J 1/6W
R681	24366152	Res, Carbon	1. 5K	J 1/6W
R682	24366681	Res, Carbon	680	J 1/6W
R683	24366151	Res, Carbon	150	J 1/6W
R684	24366682	Res, Carbon	6. 8K	J 1/6W
R685	24366103	Res, Carbon	10K	J 1/6W
R686	24366332	Res, Carbon	3. 3K	J 1/6W
R687	24366221	Res, Carbon	220	J 1/6W
R688	24366221	Res, Carbon	220	J 1/6W
R689	24366221	Res, Carbon	220	J 1/6W
R690	24366103	Res, Carbon	10K	J 1/6W
R692	24366223	Res, Carbon	22K	J 1/6W
R693	24366223	Res, Carbon	22K	J 1/6W
R694	24366472	Res, Carbon	4. 7K	J 1/6W
R695	24366472	Res, Carbon	4. 7K	J 1/6W
R696	24366472	Res, Carbon	4. 7K	J 1/6W
R697	24366103	Res, Carbon	10K	J 1/6W
R698	24366103	Res, Carbon	10K	J 1/6W
R699	24366103	Res, Carbon	10K	J 1/6W
R721	24366682	Res, Carbon	6. 8K	J 1/6W
⚠R723	24545479	Res, Fusible	4. 7	J 1/4W

MISCELLANEOUS

P506	23164560	Plug, 6P
Q508B	72471081	Screw, 3x8mm
Q611C	72471081	Screw, 3x8mm
V201	23848082	Supporter
V203	70867457	Spacer
X601	23153847	Resonator, 4MHz, TCR1014
Z601	24000916	Resistor Block, 4. 7K x4
U301	70197814	*P C Board Assy, VIDEO 2*

INTEGRATED CIRCUITS

IC401	B0379305	IC	TA8632N
IC481	70119858	IC	LA7311

TRANSISTORS

Q402	A6332430	Transistor	2SC2458-Y
Q403	A6534430	Transistor	2SA1048-Y
Q404	A6332430	Transistor	2SC2458-Y
Q405	A6332430	Transistor	2SC2458-Y
Q406	A6332430	Transistor	2SC2458-Y
Q407	A6332430	Transistor	2SC2458-Y
Q408	A6332430	Transistor	2SC2458-Y
Q409	A6012040	Transistor	RN2204
Q461	A6534430	Transistor	2SA1048-Y
Q462	A6332430	Transistor	2SC2458-Y
Q463	A6332430	Transistor	2SC2458-Y
Q464	A6332430	Transistor	2SC2458-Y
Q482	A6012020	Transistor	RN2202

DIODES

D401	A7160570	Diode	1SS176
D402	A7160570	Diode	1SS176
D461	A7160570	Diode	1SS176
D481	A7151450	Diode	1SS200
D482	A7160570	Diode	1SS176
D483	A7160570	Diode	1SS176
D484	A7160570	Diode	1SS176

COILS

L401	23237817	Coil, Peaking	TRF4681AC
L402	23237817	Coil, Peaking	TRF4681AC
L404	23237977	Coil, Peaking	TRF4680AC
L405	23237984	Coil, Peaking	TRF4180AC
L406	23237987	Coil, Peaking	TRF4100AC
L407	23237971	Coil, Peaking	TRF4221AC
L461	23237988	Coil, Peaking	TRF4829AC

LOCATION NUMBER	PART NUMBER	DESCRIPTION		
CAPACITORS				
C401	24632470	Cap, Electrolytic	47MF	M 10V
C402	24538104	Cap, Plastic	0. 1MF	J 50V
C403	24436471	Cap, Ceramic	470PF	J 50V
C404	24436820	Cap, Ceramic	82PF	J 50V
C405	24436101	Cap, Ceramic	100PF	J 50V
C406	24636010	Cap, Electrolytic	1MF	M 50V
C407	24632470	Cap, Electrolytic	47MF	M 10V
C408	24474103	Cap, Ceramic	0. 01MF	N 50V
C409	24474103	Cap, Ceramic	0. 01MF	N 50V
C410	24474103	Cap, Ceramic	0. 01MF	N 50V
C411	24474103	Cap, Ceramic	0. 01MF	N 50V
C412	24538683	Cap, Plastic	0. 068MF	J 50V
C413	24474103	Cap, Ceramic	0. 01MF	N 50V
C415	24436759	Cap, Ceramic	7.5PF	J 50V
C416	24474103	Cap, Ceramic	0. 01MF	N 50V
C417	24636010	Cap, Electrolytic	1MF	M 50V
C418	24474103	Cap, Ceramic	0. 01MF	N 50V
C419	24474103	Cap, Ceramic	0. 01MF	N 50V
C420	24340470	Cap, Ceramic	47PF	J 50V
C421	24636010	Cap, Electrolytic	1MF	M 50V
C422	24591103	Cap, Plastic	0. 01MF	J 50V
C423	24591202	Cap, Plastic	2000PF	J 50V
C424	24472180	Cap, Ceramic	18PF	J 50V
C425	24636010	Cap, Electrolytic	1MF	M 50V
C426	24474103	Cap, Ceramic	0. 01MF	N 50V
C427	24632470	Cap, Electrolytic	47MF	M 10V
C428	24474103	Cap, Ceramic	0. 01MF	N 50V
C429	24353510	Cap, Ceramic	51PF	J 50V
C430	24474103	Cap, Ceramic	0. 01MF	N 50V
C431	24474103	Cap, Ceramic	0. 01MF	N 50V
C432	24436391	Cap, Ceramic	390PF	J 50V
C433	24636010	Cap, Electrolytic	1MF	M 50V
C434	24473220	Cap, Ceramic	22PF	J 50V
C461	24632470	Cap, Electrolytic	47MF	M 10V
C462	24474271	Cap, Ceramic	270PF	K 50V
C463	24436201	Cap, Ceramic	200PF	J 50V
C464	24474103	Cap, Ceramic	0. 01MF	N 50V
C481	24436121	Cap, Ceramic	120PF	J 50V
C482	24636478	Cap, Electrolytic	0. 47MF	M 50V
C483	24632470	Cap, Electrolytic	47MF	M 10V
C484	24474103	Cap, Ceramic	0. 01MF	N 50V
C485	24474103	Cap, Ceramic	0. 01MF	N 50V
C486	24632470	Cap, Electrolytic	47MF	M 10V
C487	24636339	Cap, Electrolytic	3. 3MF	M 50V
C488	24636339	Cap, Electrolytic	3. 3MF	M 50V
RESISTORS				
R401	24366333	Res, Carbon	33K	J 1/6W
R402	24366123	Res, Carbon	12K	J 1/6W
R403	24366391	Res, Carbon	390	J 1/6W
R404	24366182	Res, Carbon	1. 8K	J 1/6W
R405	24366222	Res, Carbon	2. 2K	J 1/6W
R406	24366362	Res, Carbon	3. 6K	J 1/6W
R407	24366102	Res, Carbon	1K	J 1/6W
R408	24366222	Res, Carbon	2. 2K	J 1/6W
R409	24366511	Res, Carbon	510	J 1/6W
R410	24366102	Res, Carbon	1K	J 1/6W
R412	24367622	Res, Carbon	6.2K	G 1/6W
R413	24367182	Res, Carbon	1. 8K	G 1/6W
R414	24366181	Res, Carbon	180	J 1/6W
R415	24366102	Res, Carbon	1K	J 1/6W
R416	24366682	Res, Carbon	6. 8K	J 1/6W
R417	24366431	Res, Carbon	430	J 1/6W
R418	24366182	Res, Carbon	1. 8K	J 1/6W
R419	24366272	Res, Carbon	2. 7K	J 1/6W
R420	24366333	Res, Carbon	33K	J 1/6W
R421	24366272	Res, Carbon	2. 7K	J 1/6W
R422	24366183	Res, Carbon	18K	J 1/6W
R423	24366122	Res, Carbon	1. 2K	J 1/6W
R424	24366682	Res, Carbon	6. 8K	J 1/6W
R425	24366470	Res, Carbon	47	J 1/6W
R426	24366391	Res, Carbon	390	J 1/6W
R427	24366392	Res, Carbon	3. 9K	J 1/6W
R428	24366202	Res, Carbon	2K	J 1/6W
R429	24366103	Res, Carbon	10K	J 1/6W
R430	24366222	Res, Carbon	2. 2K	J 1/6W
R431	24366224	Res, Carbon	220K	J 1/6W
R432	24366333	Res, Carbon	33K	J 1/6W
R433	24366682	Res, Carbon	6. 8K	J 1/6W
R434	24366101	Res, Carbon	100	J 1/6W
R435	24366133	Res, Carbon	13K	J 1/6W
R436	24366123	Res, Carbon	12K	J 1/6W
R437	24366470	Res, Carbon	47	J 1/6W
R438	24366222	Res, Carbon	2. 2K	J 1/6W
R439	24366223	Res, Carbon	22K	J 1/6W
R440	24366752	Res, Carbon	7. 5K	J 1/6W
R441	24366332	Res, Carbon	3. 3K	J 1/6W
R442	24366391	Res, Carbon	390	J 1/6W
R443	24366102	Res, Carbon	1K	J 1/6W
R444	24366105	Res, Carbon	1M	J 1/6W
R445	24366621	Res, Carbon	620	J 1/6W
R446	24366221	Res, Carbon	220	J 1/6W
R451	24066956	Res, Variable	500	
R452	24066954	Res, Variable	2K	
R461	24366472	Res, Carbon	4. 7K	J 1/6W
R462	24366332	Res, Carbon	3. 3K	J 1/6W
R463	24366561	Res, Carbon	560	J 1/6W
R464	24367112	Res, Carbon	1. 1K	G 1/6W
R465	24366181	Res, Carbon	180	J 1/6W
R466	24366201	Res, Carbon	200	J 1/6W
R467	24366471	Res, Carbon	470	J 1/6W
R468	24366152	Res, Carbon	1. 5K	J 1/6W
R469	24367102	Res, Carbon	1K	G 1/6W
R470	24367102	Res, Carbon	1K	G 1/6W
R471	24367152	Res, Carbon	1.5K	G 1/6W
R472	24366222	Res, Carbon	2. 2K	J 1/6W
R473	24366333	Res, Carbon	33K	J 1/6W
R481	24366273	Res, Carbon	27K	J 1/6W
R482	24366332	Res, Carbon	3. 3K	J 1/6W
R483	24366102	Res, Carbon	1K	J 1/6W
R484	24366682	Res, Carbon	6. 8K	J 1/6W
R485	24366561	Res, Carbon	560	J 1/6W
R486	24366682	Res, Carbon	6. 8K	J 1/6W
R487	24366472	Res, Carbon	4. 7K	J 1/6W
R488	24366152	Res, Carbon	1. 5K	J 1/6W
R489	24366182	Res, Carbon	1. 8K	J 1/6W
R490	24366822	Res, Carbon	8. 2K	J 1/6W
R491	24366821	Res, Carbon	820	J 1/6W
R492	24366223	Res, Carbon	22K	J 1/6W
R493	24366223	Res, Carbon	22K	J 1/6W
R494	24366684	Res, Carbon	680K	J 1/6W
R495	24366105	Res, Carbon	1M	J 1/6W
MISCELLANEOUS				
W204	70160923	Wire		
W205	70160924	Wire		
X401	23153979	Crystal, 4. 43MHz		
X461	70138100	Function Unit, EFD-CFA11A		
Z401	23107645	Filter, 4.43MHz, TLC1108		
Z402	23107794	Filter, TLC1041, 4. 16MHz		
Z461	23107644	Filter, 3.5MHz, TLC1104		
U601	70197847	P C Board Assy, LOGIC 2		
TRANSISTORS				
QL31	A6012030	Transistor	RN2203	
QL32	A6002020	Transistor	RN1202	
CAPACITORS				
CL31	24205479	Cap, Electrolytic	4. 7MF	M 35V
RESISTORS				
RL31	24366363	Res, Carbon	36K	J 1/6W
RL32	24366472	Res, Carbon	4. 7K	J 1/6W
RL33	24366103	Res, Carbon	10K	J 1/6W
UL01	70197815	P C Board Assy, LOGIC CTL		
DIODES				
DX02	A7160590	Diode	1SS177	
DX03	A7160590	Diode	1SS177	
DX18	A8606316	Diode, LED	TLG133A-FA	
RESISTORS				
R358	24069700	Res, Variable	10K	
R556	24069696	Res, Variable	500K	

LOCATION NUMBER	PART NUMBER	DESCRIPTION		
MISCELLANEOUS				
SL03	23145394	Push Swltch, 1C1P		
SL04	23145394	Push Swltch, 1C1P		
SL05	23145394	Push Swltch, 1C1P		
SL06	23145394	Push Swltch, 1C1P		
SL07	23145394	Push Swltch, 1C1P		
SL08	23145394	Push Swltch, 1C1P		
SL09	23145394	Push Swltch, 1C1P		
SX20	23145394	Push Swltch, 1C1P		
U701	70197771	P C Board Assy, AUDIO, V-93G		
U701	70197685	P C Board Assy, AUDIO, V-93W/T		
INTEGRATED CIRCUITS				
IC701	70119790	IC	BA7751ALS	
IC702	70119791	IC	BA7755	
TRANSISTORS				
Q705	A6319300	Transistor	2SC1959-Y	
Q706	A6002040	Transistor	RN1204	
Q707	A6002040	Transistor	RN1204	
COILS				
L701	23238723	Coil, Peaking	TRF4682AC	
L702	23221937	Coil, Choke	TLN3040	
* L703	70103011	Coil, Bead Core	RH35061. 3	
CAPACITORS				
C701	24214122	Cap, Ceramic	1200PF	K 500V
C702	24206010	Cap, Electrolytic	1MF	M 50V
C703	24205479	Cap, Electrolytic	4. 7MF	M 35V
C704	24205479	Cap, Electrolytic	4. 7MF	M 35V
C705	24591103	Cap, Plastic	0. 01MF	J 50V
C706	24206010	Cap, Electrolytic	1MF	M 50V
C707	24203470	Cap, Electrolytic	47MF	M 16V
C708	24206010	Cap, Electrolytic	1MF	M 50V
C709	24203100	Cap, Electrolytic	10MF	M 16V
C710	24591183	Cap, Plastic	0. 018MF	J 50V
C711	24205479	Cap, Electrolytic	4. 7MF	M 35V
C712	24203330	Cap, Electrolytic	33MF	M 16V
C713	24205479	Cap, Electrolytic	4. 7MF	M 35V
C714	24203330	Cap, Electrolytic	33MF	M 16V
C715	24203220	Cap, Electrolytic	22MF	M 16V
C716	24203470	Cap, Electrolytic	47MF	M 16V
C717	24212472	Cap, Ceramic	4700PF	K 50V
C718	24591682	Cap, Plastic	6800PF	J 50V
C719	24538683	Cap, Plastic	0. 068MF	J 50V
C720	24214221	Cap, Ceramic	220PF	K 500V
C730	24232103	Cap, Ceramic	0. 01MF	Z 50V
C731	24232103	Cap, Ceramic	0. 01MF	Z 50V
C732	24538103	Cap, Plastic	0. 01MF	J 50V
RESISTORS				
R701	24366223	Res, Carbon	22K	J 1/6W
R702	24366470	Res, Carbon	47	J 1/6W
R703	24366221	Res, Carbon	220	J 1/6W
R704	24366123	Res, Carbon	12K	J 1/6W
R705	24366334	Res, Carbon	330K	J 1/6W
R706	24366105	Res, Carbon	1M	J 1/6W
R707	24366223	Res, Carbon	22K	J 1/6W
R708	24366104	Res, Carbon	100K	J 1/6W
R709	24366183	Res, Carbon	18K	J 1/6W
R710	24366152	Res, Carbon	1. 5K	J 1/6W
R711	24366103	Res, Carbon	10K	J 1/6W
R712	24366221	Res, Carbon	220	J 1/6W
R713	24366393	Res, Carbon	39K	J 1/6W
R714	24366103	Res, Carbon	10K	J 1/6W
R715	24366273	Res, Carbon	27K	J 1/6W
R716	24366752	Res, Carbon	7. 5K	J 1/6W
R718	24366101	Res, Carbon	100	J 1/6W
R719	24366153	Res, Carbon	15K	J 1/6W
R720	24366333	Res, Carbon	33K	J 1/6W
R751	24066939	Res, Variable	10K	
R752	24066935	Res, Variable	200K	
MISCELLANEOUS				
T701	23224971	Coil, TLN1053		
U802	70197820	P C Board Assy, POWER 1, V-93G		
U802	70197691	P C Board Assy, POWER 1, V-93T		
U802	70197882	P C Board Assy, POWER 1, V-93W		

LOCATION NUMBER	PART NUMBER	DESCRIPTION		
TRANSISTORS				
Q801	23314162	Transistor	2SD1379	
Q802	A6002010	Transistor	RN1201	
Q803	A6002010	Transistor	RN1201	
Q804	A6534430	Transistor	2SA1048-Y	
DIODES				
⚠D801	23118485	Diode	ERC04-02F	
⚠D802	23118485	Diode	ERC04-02F	
⚠D803	A7568500	Diode	1S1885	
⚠D804	A7568500	Diode	1S1885	
⚠D805	A7568500	Diode	1S1885	
⚠D806	A7568500	Diode	1S1885	
⚠D807	A7568500	Diode	1S1885	
⚠D808	A7568500	Diode	1S1885	
D809	A7160570	Diode	1SS176	
D810	A7110410	Diode, Zener	05Z 12-X	
CAPACITORS				
C803	24232223	Cap, Ceramic	0. 022MF	Z 50V
C804	24232223	Cap, Ceramic	0. 022MF	Z 50V
C805	24232223	Cap, Ceramic	0. 022MF	Z 50V
C806	24232223	Cap, Ceramic	0. 022MF	Z 50V
⚠C807	24796222	Cap, Electrolytic	2200MF	M 35V
⚠C808	24794472	Cap, Electrolytic	4700MF	M 16V
⚠C809	24795222	Cap, Electrolytic	2200MF	M 25V
C810	24538473	Cap, Plastic	0. 047MF	J 50V
RESISTORS				
R801	24366123	Res, Carbon	12K	J 1/6W
R802	24366822	Res, Carbon	8. 2K	J 1/6W
R803	24366223	Res, Carbon	22K	J 1/6W
R804	24366153	Res, Carbon	15K	J 1/6W
R805	24366472	Res, Carbon	4. 7K	J 1/6W
R806	24366103	Res, Carbon	10K	J 1/6W
R807	24553821	Res, Oxide Metal	820	J 1W
MISCELLANEOUS				
⚠F802A	23165102	Fuse Holder		
⚠F803A	23165102	Fuse Holder		
⚠F804A	23165102	Fuse Holder		
U802A	72471081	Screw, 3x8mm		
U803	70197821	P C Board Assy, POWER 2, V-93G		
U803	70197692	P C Board Assy, POWER 2, V-93T		
U803	70197883	P C Board Assy, POWER 2, V-93W		
INTEGRATED CIRCUITS				
IC811	70119737	IC	BA10324	
TRANSISTORS				
Q812	A6867970	Transistor	2SD1405-BL	
Q813	A6867970	Transistor	2SD1405-BL	
DIODES				
D821	A7160570	Diode	1SS176	
D822	A7110017	Diode, Zener	05Z 5. 6-Y	
D824	A7568500	Diode	1S1885	
D825	A7568500	Diode	1S1885	
CAPACITORS				
C811	24204330	Cap, Electrolytic	33MF	M 25V
C812	24203220	Cap, Electrolytic	22MF	M 16V
RESISTORS				
R811	24366152	Res, Carbon	1. 5K	J 1/6W
R812	24366222	Res, Carbon	2. 2K	J 1/6W
R813	24367202	Res, Carbon	2K	G 1/6W
R814	24367162	Res, Carbon	1. 6K	G 1/6W
R815	24366152	Res, Carbon	1. 5K	J 1/6W
R816	24367362	Res, Carbon	3.6K	G 1/6W
R817	24367182	Res, Carbon	1. 8K	G 1/6W
R851	24066985	Res, Variable	1K	
MISCELLANEOUS				
Q812B	70391334	Screw, 3x8mm		
Q812C	72471081	Screw, 3x8mm		
Q813A	70391334	Screw, 3x8mm		
U804	70197822	P C Board Assy, LINEFILTER, V-93G		
U804	70197693	P C Board Assy, LINEFILTER, V-93T		
U804	70197884	P C Board Assy, LINEFILTER, V-93W		
CAPACITORS				
*⚠C801	24094916	Cap, Ceramic	0.0047MF	400V
*⚠C802	24094916	Cap, Ceramic	0.0047MF	400V

LOCATION NUMBER	PART NUMBER	DESCRIPTION		
⚠C802	24094916	Cap, Ceramic	0.0047MF	400V
X⚠C802	24095831	Cap, Plastic	0.1MF	M 250V

MISCELLANEOUS

⚠F801A	23165102	Fuse Holder		
P802	23367026	Plug, 3P		
P803	23367026	Plug, 3P		
*⚠T801	23211997	Line filter, TRE3004C		
U003	70197819	P C Board Assy, RF MOD.		
UF02	70197818	P C Board Assy, TERMINAL, V-93G		
UF02	70197689	P C Board Assy, TERMINAL, V-93T/W		

INTEGRATED CIRCUITS

ICF01	70119857	IC	BA7021	

TRANSISTORS

QF03	A6002020	Transistor	RN1202	
QF04	A6012020	Transistor	RN2202	
QF05	A6002010	Transistor	RN1201	
QF06	A6534430	Transistor	2SA1048-Y	
QF07	A6332430	Transistor	2SC2458-Y	
QF08	A6342200	Transistor	2SC2878A	
QF09	A6342200	Transistor	2SC2878A	

DIODES

DF01	A7160570	Diode	1SS176	
DF02	A7152800	Diode	1SS227	
DF03	A7152800	Diode	1SS227	
DF04	A7152800	Diode	1SS227	

CAPACITORS

* CF01	24591123	Cap, Plastic	0. 012MF	J 50V
CF01	24591153	Cap, Plastic	0.015MF	J 50V
CF02	24232103	Cap, Ceramic	0. 01MF	Z 50V
CF03	24201470	Cap, Electrolytic	47MF	M 6.3V
* CF04	24214222	Cap, Ceramic	2200PF	K 500V
CF05	24203470	Cap, Electrolytic	47MF	M 16V
CF06	24232103	Cap, Ceramic	0. 01MF	Z 50V
CF07	24793471	Cap, Electrolytic	470MF	M 10V
CF08	24202101	Cap, Electrolytic	100MF	M 10V
CF09	24203100	Cap, Electrolytic	10MF	M 16V
CF10	24203100	Cap, Electrolytic	10MF	M 16V
CF11	24232223	Cap, Ceramic	0. 022MF	Z 50V
CF12	24436181	Cap, Ceramic	180PF	J 50V

RESISTORS

RF01	24366563	Res, Carbon	56K	J 1/6W
RF02	24380562	Res, Carbon	5. 6K	J 1/8W
RF04	24366103	Res, Carbon	10K	J 1/6W
RF05	24366332	Res, Carbon	3. 3K	J 1/6W
RF06	24366392	Res, Carbon	3. 9K	J 1/6W
RF07	24366102	Res, Carbon	1K	J 1/6W
RF08	24366563	Res, Carbon	56K	J 1/6W
RF09	24366472	Res, Carbon	4. 7K	J 1/6W
RF10	24366103	Res, Carbon	10K	J 1/6W
RF12	24366471	Res, Carbon	470	J 1/6W
RF13	24366911	Res, Carbon	910	G 1/6W
RF14	24380681	Res, Carbon	680	J 1/8W
RF15	24366102	Res, Carbon	1K	J 1/6W
RF16	24366820	Res, Carbon	82	J 1/6W
RF17	24366102	Res, Carbon	1K	J 1/6W
RF18	24366472	Res, Carbon	4. 7K	J 1/6W
RF21	24366103	Res, Carbon	10K	J 1/6W
RF22	24366751	Res, Carbon	750	J 1/6W
RF23	24366101	Res, Carbon	100	J 1/6W
RF24	24367331	Res, Carbon	330	G 1/6W
RF25	24366561	Res, Carbon	560	J 1/6W
RF26	24367331	Res, Carbon	330	G 1/6W
RF27	24366680	Res, Carbon	68	J 1/6W
RF28	24366332	Res, Carbon	3. 3K	J 1/6W
RF30	24366391	Res, Carbon	390	J 1/6W

MISCELLANEOUS

PF01	23116334	Socket, 21P		
SF01	23145412	Slide Switch, 2C2P		
UI06	70197624	P C Board Assy, Cam SW		
UI07	70197625	P C Board Assy, ACE Head		

RESISTORS

LOCATION NUMBER	PART NUMBER	DESCRIPTION		
RI71	24366100	Res, Carbon	10	J 1/6W
UI08	70197626	P C Board Assy, Loading Motor		
UI02	70197620	P C Board Assy, F/L (L)		

CAPACITORS

CI21	24232103	Cap, Ceramic	0. 01MF	Z 50V
UI03	70197621	P C Board Assy, F/L (R)		

CAPACITORS

CI31	24232103	Cap, Ceramic	0. 01MF	Z 50V
UI04	70197622	P C Board Assy, Reel (s)		
UI05	70197623	P C Board Assy, Reel (T)		

MECHANICAL PARTS

A101	70812735	Front Panel, V-93G
A101	70812700	Front Panel, V-93T/W
A101A	70391412	Screw, 3x12mm, V-93G/W
A101A	23721308	Screw, 3x8mm, V-93T
A101B	70391355	Screw, 3x8mm
A101D	70863842	Door
A101G	70393022	Push Nut
A104	70824265	Top Cover, V-93G
A104	70824255	Top Cover, V-93T/W
A104C	70391414	Screw, 3x8mm, V-93G/W
A105	70863843	Door
A105A	70351679	Spring
A106	70826427	Knob
A120	70815138	Bottom Cover, V-93G
A120	70815150	Bottom Cover, V-93W/T
A120A	70391355	Screw, 3x8mm
A701	70913849	Case, V-93G
A701	70913879	Case, V-93T
A701	70913862	Case, V-93W
A702	70921251	Packing (U)
A703	70921238	Packing (L)
A708	70915052	Sheet
AT01	70108161	Case
AT02	70108086	Case
AT03	70108020	Case
AT04	70108018	Filter
B101	70321854	Lever Assy
B101L	70391342	Screw, 2x4mm
B101M	70351689	Spring
B104	70396193	Washer, FI 2. 6x6x 0. 5mm
B111	70323310	Pinch Roller Assy
B112	70396196	Washer, FI 3. 6x8x 0. 5mm
B113	70396193	Washer, FI 2. 6x6x 0. 5mm
B121	70328339	Tension Lever Assy
B126	70351747	Tension Spring
B127	70325029	Band Brake assy
B128	23721310	Screw, 3x10mm
B209	23723308	Screw, 3x8mm
B210	70391081	Screw, 4x12mm
B231	70325080	Earth Brush Assy
B232	70391345	Screw, 3x3mm
B401	70322343	S Loading Ring Assy
B401G	70351634	Spring
B402	70391368	Screw
B405	70322354	T Slider Sub Assy
B406	70391361	Screw, 2. 6x3mm
B407	70322380	S Guide Roller Assy
B407E	70378598	Screw
B411	70322345	T Loading Ring Assy
B411G	70351635	Spring
B412	70391368	Screw
B416	70391361	Screw, 2. 6x3mm
B417	70353115	O-ring
B418	70353115	O-ring
B420	70322379	T Guide Roller Assy
B420E	70378598	Screw
B501	70368130	Ring Guide Roller (L1)
B501A	70368131	Ring Guide Roller (L2)

LOCATION NUMBER	PART NUMBER	DESCRIPTION
B502	70368129	Ring Guide Roller(U)
B503	70396196	Washer,FI 3. 6x8x 0. 5mm
B504	70333230	Loading Ring Gear A
B506	70333231	Loading Ring Gear B
B507	70368116	Double Cap
B509	70391334	Screw,3x8mm
B513	70333229	Phase Gear
B515	70333196	Loading Drive Gear
B516	70351676	Spring
B521	70347034	Polislider 4. 1x 6. 5x 0. 50mm
B525	70396193	Washer,FI 2. 6x6x 0. 5mm
B526	70323304	Cam Lever
B527	70368122	Stopper
B535	70351683	Spring
B539	70351631	Spring
B541	70396193	Washer,FI 2. 6x6x 0. 5mm
B542	70363305	Lever
B550	70312196	Loading Drive Assy
B553	70396064	Washer,5. 0x 2. 1x 0. 5mm
B554	70351641	Spring
B555	70351675	Spring
B556	70312193	Loading Motor Assy
B556B	70125222	DC Motor
B557	23723264	Screw, 2. 6x4mm
B558	70342123	Belt
B562	70396191	Washer,FI 2. 1x5x 0. 5mm
B565	70333197	Cam Gear
B566	70396193	Washer,FI 2. 6x6x 0. 5mm
B571	70391334	Screw,3x8mm
B603	70391358	Screw,4x12mm
B604A	70391081	Screw,4x12mm
B604B	70391048	Screw,3x6mm
BM31	70125237	Capstan Motor Assy
DI01	70115406	Diode,LED GL450V
⚠F801	23144129	Fuse,2A
⚠F802	23144164	Fuse,250V, 1. 25A
⚠F803	23144970	Fuse,250V,1.6A
⚠F804	23144970	Fuse,250V,1.6A
G001	70311374	Cylinder Assy,C4S2P
G101	70325087	Upper Cylinder Assy
G101A	70391376	Screw
G102	70321890	Lower Cylinder
G103	70321601	Ground Cap Assy
G104	70325096	Lower Cylinder Assy
G130A	23712011	Screw, 2. 6x8mm
G154	70391372	Screw
G155	23731306	Screw,3x5x6mm
G175B	23030082	Screw,3x4mm
G178C	70391373	Screw, 2. 6x4mm
G202	70322372	Lever Assy
G204	70391351	Screw, 2. 6x8mm
G205	70346035	Impedance Roller
G206	70396050	Washer,3. 9x 2. 1x 0. 5mm
G207	70396190	Washer,FI 1. 6x6x 0. 5mm
G209	70351694	Spring
G210	70351662	Spring
G211	70378512	Flange
G212	70378511	Sleeve
G213	70393025	NUT, 3x3mm
G217	70378515	Flange
G218	70378511	Sleeve
G220	70393025	NUT, 3x3mm
G221	70368134	Guide Cap
G225	70182059	ACE Sub Base Assy
G230	70378601	Shaft
G231	70351665	Spring
G232	23002250	E-ring
G233	23712308	Screw, 3x0. 5x8mm
G234	70391322	Adjust Screw
G236	70351666	Spring
G237	70393026	Nut, 3x4. 5mm
G239	70392018	Taper Nut
H001	70121076	Tuner,EG432F
H002	70123131	RF MOD.,MMD251
H002B	72471081	Screw,3x8mm

LOCATION NUMBER	PART NUMBER	DESCRIPTION
H032	70183018	FE Head
K102	70326577	Reel Motor Assy
K103	70391334	Screw,3x8mm
K104	70391345	Screw,3x3mm
K110	70326575	Idler Assy
K114	70351677	Spring
K114B	70396221	Polyslider,5. 1x 8. 8x 0. 13mm
K115	70351703	Spring
K116	70396224	Polyslider,3. 6x 7. 5x 0. 5mm
K118	70391447	Screw,2.6x3mm
K130	70316148	S Sensor Assy
K131	23721312	Screw,3x12mm
K132	70316147	T Sensor Assy
K133	23721312	Screw,3x12mm
K151	70317040	S Reel Table Assy
K151C	70351521	Spring
K152	70338075	Bearing
K153	70394153	Spacer
K155	70396193	Washer,FI 2. 6x6x 0. 5mm
K156	70363300	Lever
K157	70351700	Spring
K161	70317039	T Reel Table Assy
K161C	70351521	Spring
K162	70338100	Spacer
K163	70394153	Spacer
K165	70396193	Washer,FI 2. 6x6x 0. 5mm
K166	70326535	Lever Assy
K167	70351685	Spring
K169	70326533	Reverse Brake Assy
K170	70351706	Spring
K181	70326536	S Brake Assy
K185	70326537	T Brake Assy
K190	70351684	Spring
K301	70314248	Flont Loading Assy
K301A	70391049	Screw,3x8mm
K305	70396151	Washer,FI 2. 6
K306	70351680	Spring
K310	23723204	Screw,2x4mm
K311F	70351753	Spling
K312	70348167	Guide Roller(A)
K313	70348169	Guide Roller(C)
K315	70333242	Arm Gear L
K317	70333235	Arm Gear L
K318	70351752	Spring
K320A	23723305	Screw,3x5mm
K321C	23723310	Screw,3x10mm
K322	70333237	Worm Wheel
K323	70324321	Worm Gear Assy
K323C	70396152	Washer,FI 1. 6
K323D	70396050	Washer,3. 9x 2. 1x 0. 5mm
K324	70324345	Motor Assy
K324B	23723265	Screw, 2. 6x5mm
K325C	70333238	Gear
K326	70333240	Gear
K326A	70333241	Gear
K328A	23723264	Screw, 2. 6x4mm
K330	70363330	Lever
K335	23723205	Screw, 2. 5x5mm
K336	23723206	Screw,2x6mm
K339	23723206	Screw,2x6mm
M005	70125222	DC Motor
M101	70125246	Stator
M101A	70391378	Screw,2x3mm
M102	70125247	Rotor
M102A	70391376	Screw
⚠P801	23176720	Power Cord,250V,2.5A,V-93G
⚠P801	23176740	Power Cord,250V,V-93W/T
⚠P801A	70846155	Cord Holder
PT01	70108015	Terminal
PT02	70108016	Terminal
PT03	70108017	Terminal
QI21	70114347	Transistor,Photo PN202S-S
QI22	70114345	Transistor,Photo PN202S-R
QI41	A6090130	Hall Sensor THS103A
QI51	A6090130	Hall Sensor THS103A

LOCATION NUMBER	PART NUMBER	DESCRIPTION	LOCATION NUMBER	PART NUMBER	DESCRIPTION
RG01	70213108	Dew Heater			
SI22	23145486	Leaf Switch			
SI23	23145487	Leaf Switch			
SI24	23145485	Leaf Switch			
SI25	23145484	Leaf Switch			
SI26	23145565	Leaf Switch			
ST01	70108162	Rubber			
⚠T802	23213567	Power Transformer, TPW1403AZ			
T802A	72471081	Screw, 3x8mm			
U002A	72471081	Screw, 3x8mm			
U101A	70391349	Screw, 2. 6x3mm			
U190A	70391434	Screw, 2. 6x6mm			
U190B	70391377	Screw, 2. 6x 0. 45x7. 4mm			
U202A	72471082	Screw, 3x10mm			
U802A	72471081	Screw, 3x8mm			
U803A	72471081	Screw, 3x8mm			
U804A	72471081	Screw, 3x8mm			
UT01	23333323	P C Board Assy, REMOTE CONTROL			
V251A	70391049	Screw, 3x8mm			
V251B	70391081	Screw, 4x12mm			
V252A	72471082	Screw, 3x10mm, V-93G			
V801A	70391081	Screw, 4x12mm			
V802A	70391355	Screw, 3x8mm			
V802B	70391081	Screw, 4x12mm			
VF01B	72471081	Screw, 3x8mm			
VF01E	70391081	Screw, 4x12mm			
W212A	72471081	Screw, 3x8mm			
W213A	70391049	Screw, 3x8mm			
WF31	70160922	Wire			
Y101	70941893	Owners Manual, V-93G			
Y101	70941936	Owners Manual, V-93T			
Y101	70941930	Owners Manual, V-93W			
Y102	70941931	Owners Manual, V-93W			
Y103	70942466	Sheet			
Y104	70933070	Cover			
Y105	23364494	ANT Cable, PAL			
Y106	70148251	Remote Control Unit, VC-93B			
ZI01	70320192	LED Bracket Assy			
ZI01A	23712306	Screw, 3x0. 5x6mm			
ZT01	23109327	Ceramic Resonator, CSB455E			

SERVICE DATA
FILE NO. 034 - 221
SUPPLEMENT-B

TOSHIBA

COLOR VIDEO CASSETTE RECORDER

V-200G

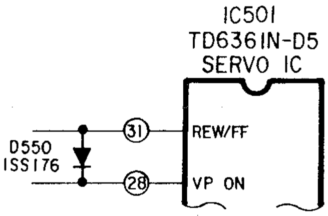
– SUMMARY –

This Service Data covers only different parts from Service Data (File No. 030-221) for Model V-93G. The technical information included in the Service Data (File No. 030-221) for V-93G can be used for V-200G servicing since V-200G is basically the same as Model V-93G.

Location No.	Description	Part No. (V-200G)	Reference No. (V-93G)
A101	Front Panel	70812812	70812735
A101A	Screw, 3 x 12mm	–	70391412
A101D	Door	–	70863842
A101G	Push Nut	–	70393022
A105	Door	70868030	70863843
A120	Bottom Cover	70815150	70815138
A701	Case	70917154	70913849
A708	Sheet	–	70915052
B231	Earth Brush Assy	70325172	70325080
B407E	Screw	–	70378598
B420E	Screw	–	70378598
B508	Bracket	70361273	–
B556B	DC Motor	–	70125222
C236	Cap, Electrolytic (0.22MF M 50V)	24206228	24206010
C487	Cap, Electrolytic (2.2MF M 50V)	24206229	24636339
C488	Cap, Electrolytic (2.2MF M 50V)	24206229	24636339
C701	Cap, Ceramic (1200PF K 50V)	24212122	24214122
CL31	Cap	–	24205479
D550	Diode, 1SS176	A7160570	–
DI01	Diode, LED	–	70115406
G103	Earth Cap	70325171	70321601
G224	ACE Base Assy	70328338	–
IC601	IC, TMP47C460AN9256	70119988	70119860
IC811	IC, BA10324	70119737	B0351500
ICX01	IC, TMP47C870N4845Z	70119990	70119878
K315	Gear	70333243	70333242
K317	Gear	70333244	70333235
K318	Spring	70351758	70351752
K319	Washer	70396187	–
K323C	Washer	70396240	70396152

Location No.	Description	Part No. (V-200G)	Reference No. (V-93G)
M002	Cylinder Motor	70903019	–
M005	DC Motor	–	70125222
M101	Stator	–	70125246
M102	Rotor	–	70125247
P801	Power Cord	23176620	23176720
PT01	Terminal	–	70108015
PT02	Terminal	–	70108016
PT03	Terminal	–	70108017
Q521	Transistor, 2SA966-Y(C)	A6533247	A6533240
Q612	Transistor, 2SC2236-Y(C)	A6325549	A6325540
Q616	Transistor, 2SC2236-Y(C)	A6325549	A6325540
Q617	Transistor, 2SC2236-Y(C)	A6325549	A6325540
Q620	Transistor, 2SC2236-Y(C)	A6325549	A6325540
Q625	Transistor, 2SB1187-E	23314332	A6639320
QL31	Transistor	–	A6012030
QL32	Transistor	–	A6002020
R210	Res, Carbon (15K J 1/6W)	24366153	24366133
R211	Res, Carbon (36K J 1/6W)	24366363	24366433
R597	Res, Carbon (4.7K J 1/6W)	24366472	24366471
R612	Res, Carbon (10K J 1/6W)	24366103	–
RL31	Res	–	24366363
RL32	Res	–	24366472
RL33	Res	–	24366103
U601	P C Board Assy, Logic 2	–	70197847
X461	Function Unit, EFD-CFA11B	70138106	70138100
Y101	Owners Manual	70941920	70941893
Y106	Remote Control Unit, VC-93B1	70148261	70148251

D550 **U202 Servo Circuit**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REW/FF
D550
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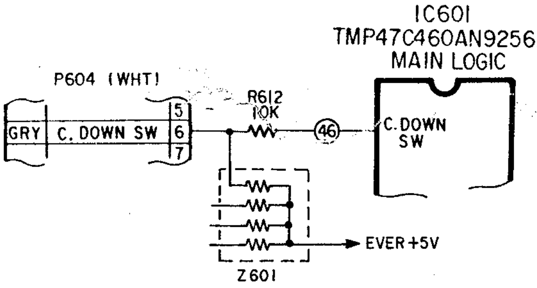
28
VP ON

R612 **U202 Logic Circuit**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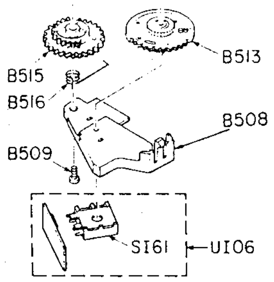
SW
EVER+5V
Z601

B508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B508
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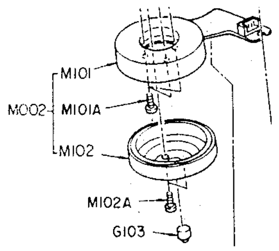
U106

M002


M101
M002
M101A
M102
M102A
G103

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